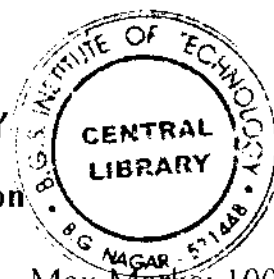# ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

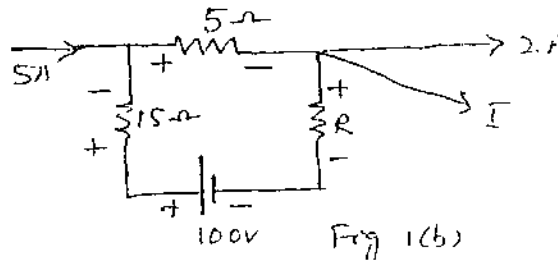Time: 3 Hours

Max Marks: 100 marks

Sub: Basic Electrical Engineering

Q P Code: 60004

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. Write the same question numbers as they appear in this question paper.
5. Write Legibly

Module-1

1 a State and explain Ohms and mention any two limitations — 6 Marks

b A portion of the network is shown in Fig 1(b) with the polarities as indicated. The voltage across the 15Ω resistor if 30V. find the value of resistance R and the current I. — 8 Marks

Fig 1(b)
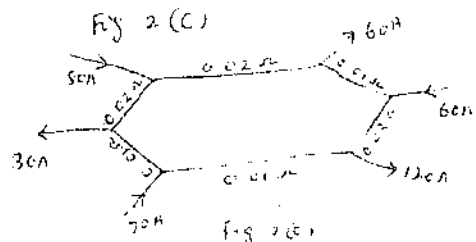
c Define RMS value of an alternating quantity and derive the expression for the same. — 6 Marks

OR

2 a In the network shown in Fig2(a), find the Voltages Vac, Vec, Vac and Vad — 6 Marks
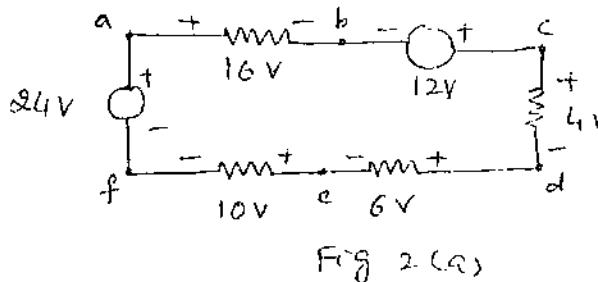
Fig 2.(a)

b Determine the current in all branches of the network shown in Fig2(c). — 8 Marks

Fig 2 (c)

c Define average value of an AC quantity and derive the expression for the same. — 6 Marks

Module-2

3 a With circuit diagram and wave forms show that the average power is zero in pure resistance.   6 Marks

   b With circuit diagram and Phasor diagram derive the expression for Line Voltage and Current for a Star connected balanced load.   8 Marks

   c A balanced Star connected load of $(8 + j6)\ \Omega|$phase is connected to a 3-phase, 230V supply. Find the line current, powerfactor, active power and reactive power.   6 Marks

OR
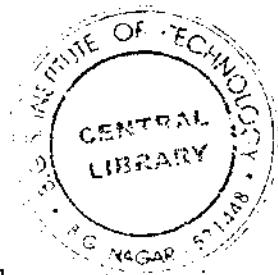
4 a Show that the average power demand is never zero in case of series RL circuit with relevant circuit and waveforms.   6 Marks

   b Show that two wattmeters are sufficient to measure 3-phase power with relevant circuit and phasor diagram.   8 Marks

   c Three similar coils are connected in star takes a total power of 1.5kw at a p.f of 0.2 lagging from a 3-Θ, 00v, 50Hz supply. Determine the parameters of the circuit.   6 Marks

Module-3

5 a Explain the constructional features of various types of transformers.   8 Marks

   b A 400|230v, 50Hz single phase transformer is provided with 500 turns on LV side. Calculate   4 Marks
      (I) No. of turns on the HV side
      (II) Effective area of cross section of the core of the flux density to be less than 1.4wb/m^2

   c What do you mean by Electric Shock? With neat diagram, explain the pipe earthing?   8 Marks

OR

6 a Derive the condition for maximum efficiency for a transform   6 Marks

   b A single phase 20KVA transformer has 1000 primary and 2500 secondary turns. The net cross sectional area in 100 cm^2. When the primary winding is connected to 500V, 50Hz supply. Calculate the following   6 Marks
      (I)   The maximum value of flux density
      (II) The secondary induced voltage
      (III) Primary and secondary full load currents

   c With circuit diagram and truth table. Explain the operation of three way control of lamps   8 Marks

Module-4

7 a Derive the EMF equation of a DC generators   6 Marks

    b Explain the various characteristics of a DC shunt motor   8 Marks

    c A 4 pole DC Shunt motor tales22.5A from a 250V supply. The armature resistance is   6 Marks
0.5Ω and shunt field resistance in 125Ω. The armature is wave wound with 300
conductors. If the flux/pole is 0.02wbs. Calculate (I) Speed (II) Torque developed and
(III) power developed.

OR

8 a What is a dc generator? What is the basic principle on which it is working? Give the   6 Marks
classification of DC generators.

    b Explain the various characteristics of series motor with relevant diagrams.   8 Marks

    c A series motor runs at 600rpm when taking a current of 110A from a 230V supply. Given   6 Marks
that $R_a = 012\Omega$, $R_{se} = 0.03\Omega$. the useful flux/pole for 110A is 0.024wb and that for 50A is
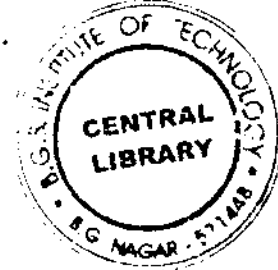0.0144wbs. Calculate the speed when the current has fallen to 50A.

Module-5

9 a Explain the constructional features of various types of synchronous generators.   8 Marks

    b What is an IM? Explain the principle of operation   6 Marks

    c A 3 phase IM is wound for 8 poles if the full load slip is 2.5%. Calculate   6 Marks
        (I)   Synchronous speed
        (II)   Slip Speed
        (III)   Rotor speed
        (IV)   Rotor frequency

OR

10 a With usual notations, derive an expression for the induced voltage for a synchronous   6 Marks
generator

    b What is a slip? Explain its significance   6 Marks

    c An 8 pole alternator runs at 750 rpm and supplies power to a 6 pole IM which has a full   8 Marks
load slip of 3%. Find the full load speed of the motor and frequency of rotor emf.

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours   Max Marks: 100 marks

SUB: ELEMENTS OF MECHANICAL ENGINEERING

Q P Code: 60010

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. Write the same question numbers as they appear in this question paper.
5. Write Legibly

MODULE-1

1 C	Explain: (i) Hydroelectric Power Plant	10 marks
	(ii) Wind Power Plant.	
b	List the Boiler Mountings and Accessories. Explain any four.	10 marks

OR

2	a	What are turbines? Explain Kaplan turbine with neat sketches.	12 marks
	b	Differentiate between Open and Closed cycle Gas Turbines.	08 marks

MODULE-2

3   a   With PV diagram explain Otto cycle and Diesel Cycle   10 marks

b   Following data were collected from a 4-stroke single cylinder oil   10 marks
engine at full load. Bore=200mm, stroke = 280mm, speed = 300rpm, indicated mean
effective pressure = 5.6 bar, torque on the brake drum=250 Nm, oil consumed= 4.2 kg/hr
and calorific value of oil = 41 MJ/kg. Determine mechanical efficiency, indicated thermal
efficiency and brake thermal efficiency.

OR

4   a   With a neat sketch explain the working of Vapour Absorption Refrigeration system   10 marks

b   Draw neat sketch and explain the working of Domestic Air Conditioner   10 marks

MODULE-3

5   a   With neat sketches explain   (i) Facing   10 marks

(ii) Thread cutting

(iii) Reaming

(iv) Counter Sinking

(v) Boring.

	b	With neat sketches explain working Operations of (i) Surface Grinding	10 marks
		(ii) Centerless Grinding	

OR

6	a	With a neat sketch explain Electric Arc Welding	10 marks
	b	Differentiate between Soldering and Welding	10 marks

MODULE-4

7	a	Define (i) Velocity ratio	04 marks
		(ii) Creep	
		(iii) Slip	
		(iv) Lubrication	
	b	Explain Idler and Stepped Cone drive mechanisms.	12 marks
	c	Two mating gears have 30 and 45 involute teeth of module 12 mm and 20^0 pressure angle. Determine velocity ratio and centre distance between gears.	04 marks

OR

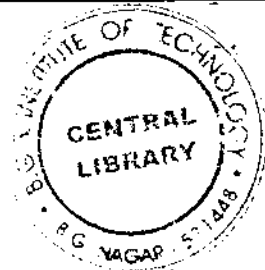|			
8	a	Explain Ball bearings and Roller bearings with neat sketches	12 marks
	b	Discuss any four properties of a good lubricant.	08 marks

MODULE-5

9	a	What are engineering materials? Classify and explain each.	06 marks
	b	Write a short note on (i) Cast iron (ii) Steel	08 marks
	c	Explain any three properties of polymeric materials	06 marks

OR

10	a	What are Matrix and Reinforcements? Explain the classification of Composite materials	08 marks
	b	Explain the applications of Composites in Aircraft and automobile industries.	12 marks

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours

Max Marks: 100 marks

SUB: CIVIL ENGINEERING AND MECHANICS

Q P Code: 60005

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. Write the same question numbers as they appear in this question paper.
5. Write Legibly

MODULE-1

1	a	With neat sketch explain different types of dams.	10 Marks
	b	Explain the role of Civil Engineer in Infrastructure development of the country	10 Marks

OR

2	a	Explain briefly any two scopes of Civil Engineering.	10 Marks
	b	Explain the Effect of Infrastructure on Socio-economic development a country	10 Marks

MODULE-2

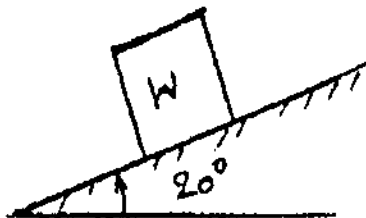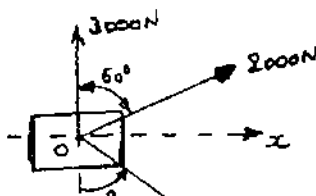|			
3	a	Explain the basic idealization of Civil Engineering	10 Marks
	b	State and prove Varignon's Theorem	5 Marks
	c	A block weighing 10kN is resting on an inclined plane as shown in Fig.Q.3(c). Determine its components normal to and parallel to the inclined plane. The plane makes an angle 20^0 with the horizontal.	5 Marks

Fig.Q.3(c)

OR

4	a	State Law of Transmissibility of Forces, Law of superposition and Law of physical independence	6 Marks
	b	Define Force and its characteristics	4 Marks
	c	A body is subjected to the three forces as shown in Fig.Q.4(c). Determine the direction of the force F so that the resultant is in 'x' direction, when i) F=5000N ii) F=3000N.	10 Marks

MODULE-3

5   a   Mention the equations of Equilibrium required for Coplanar concurrent and Coplanar non-concurrent system of forces   4 Mark

    b   State and Prove Lami's theorem   6 Marks

    c   Two spheres of radius 100mm and weight 5kN is in rectangular box as shown in Fig.Q5(c). Calculate the reactions at the point of contacts.   10 Mark
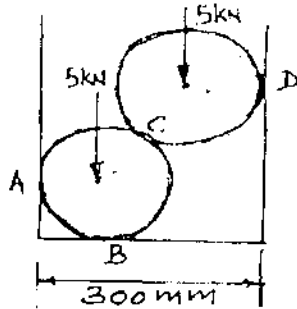

Fig.Q5(c)

OR

6   a   With neat sketch explain different types of Beams.   6 Marks

    b   What are statically determinate and indeterminate beams   4 Marks

    c   Determine the reactions for a cantilever beam fixed at 'A' and free at 'B' loaded shown in Fig.Q6(c).   10 Marks
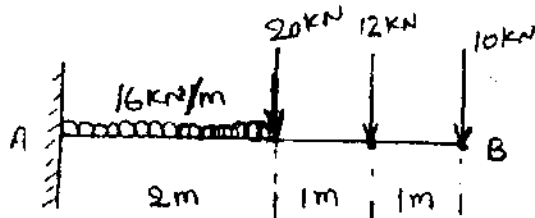

Fig.Q6(c)

MODULE-4

7   a   Derive the centroid of a Semicircle by the method of Integration.   8 Marks

    b   Locate the centroid of the plane shown in Fig.Q7(b)   12 Marks
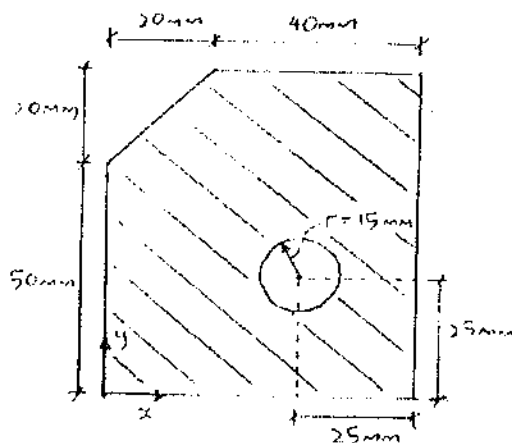

Fig.Q.7(b)

8 a Determine radius of gyration of shaded area shown in Fig.Q8(a) about the axis AB.   12 Marks

All Dimensions are in MM

b State and prove Parallel axis theorem.   8 Marks

MODULE-5

9 a Derive an expression for Greatest height reached by a particle and the time it takes   8 Marks

b A stone is dropped from the top of a tower 50m high. At the same time another stone is thrown up from the ground with a velocity of 25m/s. At what distance from the top and after how much time the two stones cross each other?   12 Marks

OR

10 a What is super elevation? Mention its advantages and disadvantages.   8 Marks

b A cricket Ball is thrown from a height of 1.8m above the ground level at angle 30^0 with the horizontal with a velocity 12m/s and is caught by the fielder at a height of 0.6m above the ground. Determine the distance between the two players.   12 Marks

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours

Max Marks: 100 marks

SUB: ENGINEERING PHYSICS

Q P Code: 60003

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. write the same question numbers as they appear in this question paper.
5. Write Legibly

MODULE – 1

1. a. Define damped oscillations and forced oscillations with examples. — 4 marks
   b. Describe the construction and working of Reddy Shock tube. — 6 marks
   c. Define simple harmonic motion. Derive the equation for simple harmonic motion using Hooke's law. — 6 marks
   d. Evaluate the resonance frequency of a spring of force constant 2467 N/m, carrying a mass of 100 gm. — 4 marks

OR

2. a. Define Mach number. Write the applications of shock waves. — 6 marks
   b. Discuss the theory of forced vibrations and hence obtain the expression for amplitude. — 10 marks
   c. Find the frequency of oscillation of a free particle executing simple harmonic motion of amplitude 0.35 m if the maximum velocity it can attain is 220 m/s. — 4 marks

MODULE – 2

3. a. Define young's modulus, bulk modulus and rigidity modulus and derive a relation between them. — 8 marks
   b. Define bending moment of a beam. Derive an expression for bending moment $\left(B.M = \left(\frac{Y}{R}\right) Ig \right)$ — 8 marks
   c. A wire length 1 m and diameter 1 mm is clamped at one of its ends. Calculate the couple required to twist the other end by 90°. Given rigidity modulus = 2.8×10^{10} N/m². — 4 marks

OR

4. a. State Hooke's law of elasticity. Derive an expression for young's modulus Y of a material of a single cantilever. — 10 marks
   b. What are torsional oscillations? Mention the expression for couple per unit twist of a solid cylinder and expression for period of oscillation. — 6 marks
   c. A solid lead sphere of radius 10.3 m is subjected to a normal pressure of 10 N/m² acting all over the surface. Determine the change in its volume. — 4 marks

PTO

MODULE – 3

5. a. Define lattice and basis. Explain seven crystal systems with neat diagram. — 10 marks

   b. Discuss different types of optical fibers with suitable diagrams. — 6 marks

   c. A monochromatic X-ray beam of wavelength 0.7 Å undergoes first order Bragg reflection from the plane (302) of cubic crystal at a glancing angle of 35°. Calculate the lattice constant — 4 marks

OR

6. a. Derive an expression for numerical aperture in terms of refractive index of core and cladding. — 6 marks

   b. Derive Bragg's law. — 4 marks

   c. Derive an expression for interplanar spacing of a crystal in terms of miller indices. — 6 marks

   d. Calculate the V-number and number of modes supported by an optical fiber of core index 1.54 and cladding index 1.5 at operating wavelength 1.3 μm. The diameter of the fiber is 50 μm. — 4 marks

MODULE – 4

7. a. Set up 1-dimensional time independent Schrodinger's wave equation and mention any two properties of wave function. — 8 marks

   b. Derive an expression for energy density at thermal equilibrium through Einstein's coefficients. — 8 marks

   c. An electron has a speed of 500 m/s correct up to 0.01 %. With what fundamental accuracy the position of the electron can be located? — 4 marks

OR

8. a. Show that the electron cannot exist inside the nucleus using Heisenberg's uncertainity principle. — 6 marks

   b. What is a laser? Describe the construction and working of CO_2 laser with the help of energy level diagram. — 10 marks

   c. A pulsed laser emits of pulses of 20 ns duration with an average power / pulse being 0.1 Mw. If the number of photons emitted per pulse is 6.981×10^{15}, calculate the wavelength of the laser. — 4 marks

MODULE – 5

9. a. Define Fermi level and Fermi factor. Write the assumptions of quantum free electron theory. — 6 marks

   b. Derive an expression for conductivity of semiconductors. — 6 marks

   c. What are polar and non polar dielectrics? — 4 marks

   d. The Fermi level in silver is 5.5 eV at 0°K. Calculate the number of free electrons / unit volume. — 4 marks

OR

10. a. Obtain an expression for Fermi energy at 0° K. — 6 marks

    b. Derive Clausius-Mossotti equation. — 6 marks

    c. Discuss solid, liquid and gaseous dielectrics with examples. — 4 marks

    d. The following data are given for intrinsic germanium at 300 K. The electron and hole mobilities are 0.85 $m^2V^{-1}s^{-1}$ and 0.04 $m^2V^{-1}s^{-1}$. Find the resistivity of the sample if the intrinsic carrier concentration is $7 \times 10^{12} m^{-3}$. — 4 marks

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours   Max Marks: 100 marks

SUB: ENGLISH – 1

Q P Code: 60001

Instructions: 1. Your answer should be specific to the questions asked.
2. write the same question numbers as they appear in this question paper.
3. Write Legibly

Question Paper Version – B

Answer all the questions   100X1=100

1. How many of the following numbers are divisible by 3 but not by 9?

   2133, 2343, 3474, 4131, 5286, 5340, 6336, 7347, 8115, 9276

   a. 5   b. 6   c. 7   d. None of these

2. The difference between the place value and the face value of 6 in the numeral 856973 is

   a. 973   b. 5994   c. 5973   d. 435

3. The smallest 6-digit number exactly divisible by 111 is

   a. 111111   b. 11077   c. 100011   d. 2233109

4. The largest 5-digit number exactly divisible by 91 is:

   a. 88899   b. 99918   c. 45361   d. 98978

5. What is the unit digit in $(4137)^{754}$?

   a. 1   b. 3   c. 7   d. 9

Read the following passages and answer the questions given below (Q6 – 15)

The Greening of the aged

1. A visit to most homes for the aged is so depressing that second visits are uncommon. The men and women we see there are listless, unresponsive, and often incapable of performing simple tasks. They appear unmotivated, uninterested, and turned away from others. Their debilitated physical and emotional condition is not a necessary consequence of old age. Rather, it is the inevitable result of being treated like a passive object in an institutional setting.

2. Recently, two young researchers from Yale University, Ellen Langer and Judith Rodin, decided to see whether they could reverse the debilitated condition of residents in one of these old-age homes (1976). Their sample consisted of 91 residents, aged 65 to 90, all well enough to be walking about. The investigators reasoned that the crucial psychological process missing in such institutions was taking responsibility for one's own decisions. To be an actor in life's drama, we must act, decide, and be responsible for the consequences. To let others decide for us is to lose the main ingredient in self-esteem and competence.

6. How are the residents of old age homes described in paragraph 1?

    a. Healthy   b. Sad   c. Uncommon   d. Weak, poor and troubled

7. According to the author, what is the reason for their poor condition?

    a. Left out feel   b. Uninterested   c. Ill treated like a passive object   d. None of these

8. (Par. 2) What was the researchers' hypothesis; i.e., what idea was their research based on?

    a. Improving self esteem   b. Taking responsibility

    c. Less competence   d. Change the condition of the poor

9. (Par. 2) What is the main ingredient in self-esteem and confidence?

    a. Act and decide   b. Decision making   c. Debilitated condition   d. None of these

3. Accordingly, about half of the participants in the study were randomly assigned to a situation in which they received instructions that emphasized the need for them to take more responsibility for caring for themselves and for improving the quality of life in the home. They were then asked to choose a plant from among a box of them as a present – but they were told they had to care for it. In contrast, the second group of patients was given instructions that stressed the responsibility of the staff to provide good services for the residents. They were handed a plant as a present and informed that the nurses would water it for them.

4. The results of the enhanced sense of personal responsibility were dramatic. On questionnaire ratings and behavioural measures, the experimental group ("I'll do it myself") showed significant improvement over the comparison group ("let George do it for you") on alertness, active participation, and general sense of well-being.

10. (Par. 4) How did the researchers measure the results of the study?

    a. Questionnaire ratings   b. Behavioural measures

    c. Questionnaire ratings and behavioural measures   d. None of these

11. Which group improved more?

    a. Experimental   b. Comparison   c. Both   d. None of these

12. In what areas did the better group show improvement?

    a. Alertness   b. Active participation   c. Sense of well being   d. All of these

5. Eighteen months later, these positive results still persisted, as indicated by the nurses' higher ratings of the happiness, sociability, and vigor of the personally responsible group. But most startling of all, encouraging the residents to be responsible for themselves and their plants made them live longer! the overall death rate for the entire nursing home during an eighteen-month period prior to the experiment was 25 percent. Following the experiment, only 15 percent of the personally responsible residents died, compared to twice as many for the no-responsibility group.

6. In conclusion, psychological interventions of this kind not only improve mood and attitudes; they seem to affect the very process of life and death itself.

13. (Par. 5) How were results 18 months later?

    a. Results perished   b. No change   c. Results remained   d. None of these

14. What was the most surprising finding of the study?

    a. None changed

    b. Residents became brave

    c. Their plants made them live longer

    d. None of these

15. Choose the correct conclusion from the options given below.

    a. Residents can be changed

    b. Psychological interventions help residents

    c. People will not die

    d. None of these

16. When we read only to find the answer, this technique is called.

    a. Skimming   b. Scanning   c. Churning   d. Wringing

17. When we read by skipping through sections of a passage, this technique is called.

    a. Skimming   b. Scanning   c. Churning   d. Wringing

18. When we read only the headings to identify the answer, this technique is called.

    a. Skimming   b. Scanning   c. Churning   d. Wringing

19. Which technique helps you to read up to 1000 words a minute?

    a. Skimming   b. Scanning   c. Churning   d. Wringing

20. Which technique is very useful to identify which section of a passage is to be read?

    a. Skimming   b. Scanning   c. Churning   d. Wringing

21. In the 5 stages of listening process which stage is 'remembering'?

    a. Stage 1   b. Stage 2   c. Stage 3   d. Stage 4

22. In the 5 stages of listening process which stage is 'receiving'?

    a. Stage 1   b. Stage 2   c. Stage 3   d. Stage 4

23. In the 5 stages of listening process which stage is 'understanding'?

    a. Stage 1   b. Stage 2   c. Stage 3   d. Stage 5

24. In the 5 stages of listening process which stage is 'evaluating'?

    a. Stage 4   b. Stage 1   c. Stage 3   d. Stage 5

25. In the 5 stages of listening process which stage is 'responding'?

    a. Stage 4   b. Stage 1   c. Stage 3   d. Stage 5

26. What is the barrier of listening called if a person has hearing problems?

    a. Egotism   b. Rapid thoughts   c. Impaired hearing   d. None of these

27. What is the barrier of listening called if a person's mind wanders onto topics which are not related to speaker's words?

28. What is the barrier of listening called if a person is given a lot of information to receive?

    a. Egotism   b. Rapid thoughts   c. Overloaded messages   d. None of these

29. What is the barrier of listening called if a person cannot understand the accent spoken by the speaker?

    a. Faulty assumptions   b. Cultural differences   c. Egotism   d. None of these

30. What is the barrier of listening called if a person thinks listening is merely a passive activity?

    a. Faulty assumptions   b. Cultural differences   c. Egotism   d. None of these

31. P5QR, P4QS, P3QT, _____, P1QV

    a. 2PQW   b. PQV2   c. P2QU   d. PQ3U

32. QPO, NML, KJI, _____, EDC

    a. HGF   b. CAB   c. JKL   d. GHI

33.SCD, TEF, UGH, ____, WKL

    a. CMN   b. UJI   c. VIJ   d. IJT

34. ELFA, GLHA, ILJA, _____, MLNA

    a. OLPA   b. KLMA   c. LLMA   d. KLLA

35. In a certain code, SIKKIM is written as THLJJL, how is TRAINING written in that code?

    a. SQBHOHOF   b. UQBHOIOF   c. UQBHOHOI   d. UQBHOHOF

36. if COMPLETED is coded as MOCELBDET then DIRECTION will be coded as:

    a. RIDTCENOJ   b. SIDTCENOI   c. RIDTCENOI   d. RIETCENOI

37. EAT+THAT=APPLE. What is A+L+T?

    a. 13   b. 10   c. 11   d. 9

38. SEND+MORE=MONEY. What is M+O+N+E+Y?

    a. 11   b. 12   c. 13   d. 14

39. BASE+BALL=GAMES. What is G+A+M+E+S?

    a. 21   b. 23   c. 25   d. 29

40. LETS+WAVE=LATER. What is L+A+T+E+R?

    a.12   b. 13   c. 14   d. 15

41.DONALD+GERALD=ROBERT. What is R+O+B+E+R+T?

    a. 22   b. 24   c. 26   d. 2

42. SCD, TEF, UGH, ____, WKL

43. FAG, GAF, HAI, IAH, _____

    a. JAK   b. HAL   c. HAL   d. HAI

44. PRAG : QTDK : : STOP : ?

    a. LMNP   b. BDFE   c. QSTG   d. TVRT

45. ELF+ELF=FOOL. What is F+O+O+L?

    a. 11   b. 12   c. 13   d. 14

46. ROADS+CROSS=DANGER. What is D+A+N+G+E+R?

    a. 28   b. 31   c. 33   d. 35

47. RAB, SCD, TEF, _____, VIJ

    a. GVH   b. UGH   c. UVG   d. HGU

48. SRQ, PON, MLK, _____, GFE

    a. IJH   b. JIH   c. JHI   d. IHJ

49. KEL, LFM, MGN, NHO, OIP, _____

    a. JPO   b. PJO   c. PJQ   d. None of these

50. E2HI, _____, EHI4, E5HI, EH6I

    a. EH3I   b. EI3H   c. I2E3H   d. None of these

51. The students who apply to Engineering colleges drop out because of lack of guidance.

    a. True   b. False   c. Neutral   d. Not Applicable

52. The students are not responsible for the decisions that they take to join Engineering.

    a. True   b. False   c. Neutral   d. Not Applicable

53. There is a massive difference between what a college expects than a school from its students.

    a. True   b. False   c. Neutral   d. Not Applicable

54. The students must have clear picture of what they want to become after engineering right from 1st year of Engineering.

    a. True   b. False   c. Neutral   d. Not Applicable

55. The students must not approach the library for referring to books which is prescribed in the syllabus.

    a. True   b. False   c. Neutral   d. Not Applicable

56. An Engineer, in order to be performing well in their career must have only technical knowledge.

    a. True   b. False   c. Neutral   d. Not Applicable

57. Engineers are the reasons for which the commerce, trade and marketing has experienced drastic improvement.

    a. True   b. False   c. Neutral   d. Not Applicable

58. In order to be an effective Engineer, one must pay closer and keen attention to minutest details.

      a. True   b. False   c. Neutral   d. Not Applicable

59. Engineers do not require leadership as well as management skills.

      a. True   b. False   c. Neutral   d. Not Applicable

60. Engineers know the value of time.

      a. True   b. False   c. Neutral   d. Not Applicable

61. _____ mom is on the phone.

      a. You   b. Your   c. You're   d. Yours

62. _____ looking a lot better than you did.

      a. You   b. Your   c. You're   d. Yours

63. If _____ in town, come by and see us.

      a. you   b. your   c. you're   d. yours

64. If you do it again _____ certain to get sent to the office.

      a. you   b. your   c. you're   d. yours

65. Was it _____ brother I saw last week?

      a. you   b. your   c. you're   d. yours

66. I hope that _____ happy in your new job.

      a. you   b. your   c. you're   d. yours

67. I hope you get lots of presents on _____ birthday.

      a. you   b. your   c. you're   d. yours

68. _____ not going out looking like that.

      a. You   b. Your   c. You're   d. Yours

69. I'm coming over to _____ house to sort this out.

      a. you   b. your   c. you're   d. yours

70. Do you know where _____ going?

      a. you   b. your   c. you're   d. yours

71. The applause showed how deeply the presentation had _____ the audience.

      a. affect   b. effect   c. affected   d. effected

72. His attitude was _____ by his upbringing.

      a. affect   b. effect   c. affected   d. effected
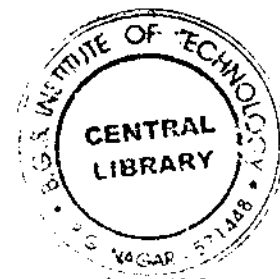
73. No matter what he does, it will have no _____ on me.

    a. affect   b. effect   c. affected   d. effected

74. No matter what he does, it will not _____ me.

    a. affect   b. effect   c. affected   d. effected

75. How was the team _____ by the loss of their coach?

    a. affect   b. effect   c. affected   d. effected

76. What is the type of introduction called, when it is required to introduce yourself in quick time frame?

    a. Self-introduction   b. Group introduction   c. Elevator introduction   d. None of these

77. Choose the best option which suits the best for professional introduction.

    a. Dress appropriately   b. Keep eye contact   c. Be confident   d. All of these

78. A non – formally prepared speech is called.

    a. Extempore speaking   b. Presentation   c. Debate   d. None of these

79. Which of these element is not involved in the process of communication?

    a. Pipe   b. Sender   c. Message   d. Channel

80. Which of these is the third element of communication?

    a. Sender   b. Receiver   c. Channel   d. Message

81. Which of these is the most important tool of communication?

    a. Body language   b. Gestures   c. Language   d. Posture

82. Which of these must be avoided in any presentation?

    a. Proper grammar   b. Complex words   c. Short sentences   d. Clear voice

83. Which of these is not important in an oral presentation?

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84. Which of these is the best way to establish a proper rapport with audience?

    a. Pointing finger   b. Making eye contact   c. Waving hands   d. Standing erect

85. In an oral presentation, the speaker should not _____

    a. Panic   b. Pause   c. Making eye contact   d. Inspire

86. Which number among the following is divisible by 7?

    a. 77754   b. 7666   c. 77784   d. 5643

87. Which number among the following is divisible by 8?

    a. 762928   b. 220953   c. 19537455   d. None of these

88. Which number among the following is divisible by both 7 and 11?

    a. 4540074   b. 293076   c. 1793498   d. 5740702

89. Which of the following number is divisible by 63?

    a. 492815   b. 4107872   c. 5893407   d. 6221628

90. Which number is divisible by 18?

    a. 52794   b. 432181   c. 1725516   d. None of these

91. What is the unit digit in the product (365 x 659 x 771)?

    a. 1   b. 2   c. 4   d. 6

92. What is the unit digit in 7105?

    a. 1   b. 5   c. 7   d. 9

93. How many 3-digit numbers are completely divisible 6?

    a. 140   b. 150   c. 151   d. 166

94. (112 + 122 + 132 + ... + 202) = ?

    a. 398   b. 2485   c. 4232   d. 1563

95. What is the unit digit in (795 - 358)?

    a. 0   b. 4   c. 6   d.

96. What will be remainder when 17200 is divided by 18?

    a. 17   b. 16   c. 1   d. 2

97. When a number is divided by 13, the remainder is 11. When the same number is divided by 17, then remainder is 9. what is the number?

    a. 339   b. 349   c. 369   d. none of these

98. In a division sum, the divisor is 10 times the quotient and 5 times the remainder. If the remainder is 46, what is the dividend?

    a. 4236   b. 4036   c. 4336   d. 5336

99. On dividing a number by 357, we get 39 as remainder. On dividing the same number 17, what will be the remainder?

    a. 0   b. 3   c. 5   d. 11

100. On dividing a number by 5, we get 3 as remainder. What will the remainder when the square of the number is divided by 5?

    a. 0   b. 1   c. 2   d. 4

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours

Max Marks: 100 marks

SUB: ENGLISH – 1

Q P Code: 60001

Instructions: 1. Your answer should be specific to the questions asked.
2. write the same question numbers as they appear in this question paper.
3. Write Legibly

Question Paper Version – C
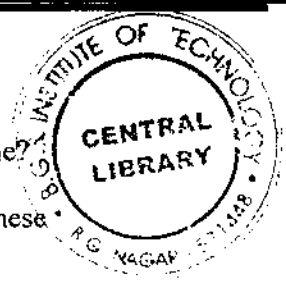
Answer all the questions

100X1=100

1. The students who apply to Engineering colleges drop out because of lack of guidance.

   a. True   b. False   c. Neutral   d. Not Applicable

2. The students are not responsible for the decisions that they take to join Engineering.

   a. True   b. False   c. Neutral   d. Not Applicable

3. There is a massive difference between what a college expects than a school from its students.

   a. True   b. False   c. Neutral   d. Not Applicable

4. The students must have clear picture of what they want to become after engineering right from 1st year of Engineering.

   a. True   b. False   c. Neutral   d. Not Applicable

5. The students must not approach the library for referring to books which is prescribed in the syllabus.

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6. An Engineer, in order to be performing well in their career must have only technical knowledge.

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11. _____ mom is on the phone.

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12. _____ looking a lot better than you did.

    a. You   b. Your   c. You're   d. Yours

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    a. you   b. your   c. you're   d. yours

14. If you do it again _____ certain to get sent to the office.

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15. Was it _____ brother I saw last week?

    a. you   b. your   c. you're   d. yours

16. I hope that _____ happy in your new job.

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17. I hope you get lots of presents on _____ birthday.

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19. I'm coming over to _____ house to sort this out.

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20. Do you know where _____ going?

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21. The applause showed how deeply the presentation had _____ the audience.

    a. affect   b. effect   c. affected   d. effected

22. His attitude was _____ by his upbringing.

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23. No matter what he does, it will have no _____ on me.

    a. affect   b. effect   c. affected   d. effected

24. No matter what he does, it will not _____ me.

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25. How was the team _____ by the loss of their coach?

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26. What is the type of introduction called, when it is required to introduce yourself in quick time frame?

a. Self-introduction   b. Group introduction   c. Elevator introduction   d. None of these

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42. What is the unit digit in 7105?

    a. 1   b. 5   c. 7   d. 9

43. How many 3-digit numbers are completely divisible 6?

    a. 140   b. 150   c. 151   d. 166

44. (112 + 122 + 132 + ... + 202) = ?

    a. 398   b. 2485   c. 4232   d.1563

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46. What will be remainder when 17200 is divided by 18?

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48. In a division sum, the divisor is 10 times the quotient and 5 times the remainder. If the remainder is 46, what is the dividend?

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49. On dividing a number by 357, we get 39 as remainder. On dividing the same number 17, what will be the remainder?

    a. 0   b. 3   c. 5   d. 11

50. On dividing a number by 5, we get 3 as remainder. What will the remainder when the square of the number is divided by 5?

    a. 0   b. 1   c. 2   d. 4

51. How many of the following numbers are divisible by 3 but not by 9?

    2133, 2343, 3474, 4131, 5286, 5340, 6336, 7347, 8115, 9276

    a. 5   b. 6   c. 7   d. None of these

52. The difference between the place value and the face value of 6 in the numeral 856973 is

    a. 973   b. 5994   c. 5973   d. 435

53. The smallest 6-digit number exactly divisible by 111 is:

    a. 111111   b. 11077   c. 100011   d. 2233109

54. The largest 5-digit number exactly divisible by 91 is:

    a. 88899   b. 99918   c. 45361   d. 98978

55. What is the unit digit in (4137)754?

    a. 1   b. 3   c. 7   d. 9

Read the following passages and answer the questions given below (Q56 – 65)

The Greening of the aged

1. A visit to most homes for the aged is so depressing that second visits are uncommon. The men and women we see there are listless, unresponsive, and often incapable of performing simple tasks. They appear unmotivated, uninterested, and turned away from others. Their debilitated physical and emotional condition is not a necessary consequence of old age. Rather, it is the inevitable result of being treated like a passive object in an institutional setting.

2. Recently, two young researchers from Yale University, Ellen Langer and Judith Rodin, decided to see whether they could reverse the debilitated condition of residents in one of these old-age homes (1976). Their sample consisted of 91 residents, aged 65 to 90, all well enough to be walking about. The investigators reasoned that the crucial psychological process missing in such institutions was taking responsibility for one's own decisions. To be an actor in life's drama, we must act, decide, and be responsible for the consequences. To let others decide for us is to lose the main ingredient in self-esteem and competence.

56. How are the residents of old age homes described in paragraph 1?

    a. Healthy   b. Sad   c. Uncommon   d. Weak, poor and troubled

57. According to the author, what is the reason for their poor condition?

    a. Left out feel   b. Uninterested   c. Ill treated like a passive object   d. None of these

58. (Par. 2) What was the researchers' hypothesis; i.e., what idea was their research based on?

    a. Improving self esteem   b. Taking responsibility
    c. Less competence   d. Change the condition of the poor

59. (Par. 2) What is the main ingredient in self-esteem and confidence?

    a. Act and decide   b. Decision making   c. Debilitated condition   d. None of these

3. Accordingly, about half of the participants in the study were randomly assigned to a situation in which they received instructions that emphasized the need for them to take more responsibility for caring for themselves and for improving the quality of life in the home. They were then asked to choose a plant from among a box of them as a present – but they were told they had to care for it. In contrast, the second group of patients was given instructions that stressed the responsibility of the staff to provide good services for the residents. They were handed a plant as a present and informed that the nurses would water it for them.

4. The results of the enhanced sense of personal responsibility were dramatic. On questionnaire ratings and behavioural measures, the experimental group ("I'll do it myself") showed significant improvement over the comparison group ("let George do it for you") on alertness, active participation, and general sense of well-being.

60. (Par. 4) How did the researchers measure the results of the study?
    a. Questionnaire ratings   b. Behavioural measures
    c. Questionnaire ratings and behavioural measures   d. None of these

61. Which group improved more?

    a. Experimental   b. Comparison   c. Both   d. None of these

62. In what areas did the better group show improvement?

    a. Alertness   b. Active participation   c. Sense of well being   d. All of these

5. Eighteen months later, these positive results still persisted, as indicated by the nurses' higher ratings of the happiness, sociability, and vigor of the personally responsible group. But most startling of all, encouraging the residents to be responsible for themselves and their plants made them live longer! the overall death rate for the entire nursing home during an eighteen-month period prior to the experiment was 25 percent. Following the experiment, only 15 percent of the personally responsible residents died, compared to twice as many for the no-responsibility group.

6. In conclusion, psychological interventions of this kind not only improve mood and attitudes, they seem to affect the very process of life and death itself.

63. (Par. 5) How were results 18 months later?

    a. Results perished   b. No change   c. Results remained   d. None of these

64. What was the most surprising finding of the study?

    a. None changed   b. Residents became brave

    c. Their plants made them live longer   d. None of these

65. Choose the correct conclusion from the options given below.

    a. Residents can be changed   b. Psychological interventions help residents

    c. People will not die   d. None of these

66. When we read only to find the answer, this technique is called.

    a. Skimming   b. Scanning   c. Churning   d. Wringing

67. When we read by skipping through sections of a passage, this technique is called.

    a. Skimming   b. Scanning   c. Churning   d. Wringing

68. When we read only the headings to identify the answer, this technique is called.

    a. Skimming   b. Scanning   c. Churning   d. Wringing

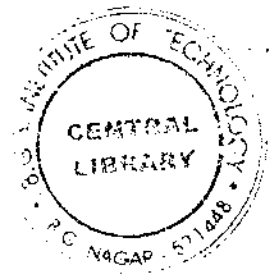69. Which technique helps you to read up to 1000 words a minute?

    a. Skimming   b. Scanning   c. Churning   d. Wringing

70. Which technique is very useful to identify which section of a passage is to be read?

    a. Skimming   b. Scanning   c. Churning   d. Wringing

71. In the 5 stages of listening process which stage is 'remembering'?

    a. Stage 1   b. Stage 2   c. Stage 3   d. Stage 4

72. In the 5 stages of listening process which stage is 'receiving'?

    a. Stage 1   b. Stage 2   c. Stage 3   d. Stage 4

73. In the 5 stages of listening process which stage is 'understanding'?

    a. Stage 1   b. Stage 2   c. Stage 3   d. Stage 5

74. In the 5 stages of listening process which stage is 'evaluating'?

    a. Stage 4   b. Stage 1   c. Stage 3   d. Stage 5

75. In the 5 stages of listening process which stage is 'responding'?

    a. Stage 4   b. Stage 1   c. Stage 3   d. Stage 5

76. What is the barrier of listening called if a person has hearing problems?

    a. Egotism   b. Rapid thoughts   c. Impaired hearing   d. None of these

77. What is the barrier of listening called if a person's mind wanders onto topics which are not related to speaker's words?

    a. Egotism   b. Rapid thoughts   c. Impaired hearing   d. None of these

78. What is the barrier of listening called if a person is given a lot of information to receive?

    a. Egotism   b. Rapid thoughts   c. Overloaded messages   d. None of these

79. What is the barrier of listening called if a person cannot understand the accent spoken by the speaker?

    a. Faulty assumptions   b. Cultural differences   c. Egotism   d. None of these

80. What is the barrier of listening called if a person thinks listening is merely a passive activity?

    a. Faulty assumptions   b. Cultural differences   c. Egotism   d. None of these

81. P5QR, P4QS, P3QT, _____, P1QV

    a. 2PQW   b. PQV2   c. P2QU   d. PQ3U

82. QPO, NML, KJI, _____, EDC

    a. HGF   b. CAB   c. JKL   d. GHI

83. SCD, TEF, UGH, _____, WKL

    a. CMN   b. UJI   c. VIJ   d. IJT

84. ELFA, GLHA, ILJA, _____, MLNA

    a. OLPA   b. KLMA   c. LLMA   d. KLLA

85. In a certain code, SIKKIM is written as THLJJL, how is TRAINING written in that code?

    a. SQBHOHOF   b. UQBHOIOF   c. UQBHOHOI   d. UQBHOHOF

86. if COMPLETED is coded as MOCELPDET, then DIRECTION will be coded as:

    a. RIDTCENOJ   b. SIDTCENOI   c. RIDTCENOI   d. RIETCENOI

87. EAT+THAT=APPLE. What is A+L+T?

  a. 13   b. 10   c. 11   d. 9

88. SEND+MORE=MONEY. What is M+O+N+E+Y?

  a. 11   b. 12   c. 13   d. 14

89. BASE+BALL=GAMES. What is G+A+M+E+S?

  a. 21   b. 23   c. 25   d. 29

90. LETS+WAVE=LATER. What is L+A+T+E+R?

  a. 12   b. 13   c. 14   d. 15

91. DONALD+GERALD=ROBERT. What is R+O+B+E+R+T?

  a. 22   b. 24   c. 26   d. 2

92. SCD, TEF, UGH, ____, WKL

  a. CMN   b. UJI   c. VIJ   d. IJT

93. FAG, GAF, HAI, IAH, ____

  a. JAK   b. HAL   c. HAL   d. HAI

94. PRAG : QTDK : : STOP : ?

  a. LMNP   b. BDFE   c. QSTG   d. TVRT

95. ELF+ELF=FOOL. What is F+O+O+L?

  a. 11   b. 12   c. 13   d. 14

96. ROADS+CROSS=DANGER. What is D+A+N+G+E+R?

  a. 28   b. 31   c. 33   d. 35

97. RAB, SCD, TEF, ____, VIJ

  a. GVH   b. UGH   c. UVG   d. HGU

98. SRQ, PON, MLK, ____, GFE

  a. IJH   b. JIH   c. JHI   d. IHJ

99. KEL, LFM, MGN, NHO, OIP, ____

  a. JPO   b. PJO   c. PJQ   d. None of these

100. E2HI, _____, EHI4, E5HI, EH6I

  a. EH3I   b. EI3H   c. I2E3H   d. None of these

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours   Max Marks: 100 marks

SUB: ENGLISH – 1

Q P Code: 60001

Instructions: 1. Your answer should be specific to the questions asked.

2. write the same question numbers as they appear in this question paper.

3. Write Legibly

Question Paper Version – B

Answer all the questions   100X1=100

1. How many of the following numbers are divisible by 3 but not by 9?

    2133, 2343, 3474, 4131, 5286, 5340, 6336, 7347, 8115, 9276

    a. 5   b. 6   c. 7   d. None of these

2. The difference between the place value and the face value of 6 in the numeral 856973 is

    a. 973   b. 5994   c. 5973   d. 435

3. The smallest 6-digit number exactly divisible by 111 is:

    a. 111111   b. 11077   c. 100011   d. 2233109

4. The largest 5-digit number exactly divisible by 91 is:

    a. 88899   b. 99918   c. 45361   d. 98978

5. What is the unit digit in (4137)754?

    a. 1   b. 3   c. 7   d. 9

Read the following passages and answer the questions given below (Q6 – 15)

The Greening of the aged

1. A visit to most homes for the aged is so depressing that second visits are uncommon. The men and women we see there are listless, unresponsive, and often incapable of performing simple tasks. They appear unmotivated, uninterested, and turned away from others. Their debilitated physical and emotional condition is not a necessary consequence of old age. Rather, it is the inevitable result of being treated like a passive object in an institutional setting.

2. Recently, two young researchers from Yale University, Ellen Langer and Judith Rodin, decided to see whether they could reverse the debilitated condition of residents in one of these old-age homes (1976). Their sample consisted of 91 residents, aged 65 to 90, all well enough to be walking about. The investigators reasoned that the crucial psychological process missing in such institutions was taking responsibility for one's own decisions. To be an actor in life's drama, we must act, decide, and be responsible for the consequences. To let others decide for us is to lose the main ingredient in self-esteem and competence.

6. How are the residents of old age homes described in paragraph 1?

    a. Healthy   b. Sad   c. Uncommon   d. Weak, poor and troubled

7. According to the author, what is the reason for their poor condition?

    a. Left out feel   b. Uninterested   c. Ill treated like a passive object   d. None of these

8. (Par. 2) What was the researchers' hypothesis: i.e., what idea was their research based on?

    a. Improving self esteem   b. Taking responsibility

    c. Less competence   d. Change the condition of the poor

9. (Par. 2) What is the main ingredient in self-esteem and confidence?

    a. Act and decide   b. Decision making   c. Debilitated condition   d. None of these

3. Accordingly, about half of the participants in the study were randomly assigned to a situation in which they received instructions that emphasized the need for them to take more responsibility for caring for themselves and for improving the quality of life in the home. They were then asked to choose a plant from among a box of them as a present but they were told they had to care for it. In contrast, the second group of patients was given instructions that stressed the responsibility of the staff to provide good services for the residents. They were handed a plant as a present and informed that the nurses would water it for them.

4. The results of the enhanced sense of personal responsibility were dramatic. On questionnaire ratings and behavioural measures, the experimental group ("I'll do it myself") showed significant improvement over the comparison group ("let George do it for you") on alertness, active participation, and general sense of well-being.

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5. Eighteen months later, these positive results still persisted, as indicated by the nurses' higher ratings of the happiness, sociability, and vigor of the personally responsible group. But most startling of all, encouraging the residents to be responsible for themselves and their plants made them live longer! the overall death rate for the entire nursing home during an eighteen-month period prior to the experiment was 25 percent. Following the experiment, only 15 percent of the personally responsible residents died, compared to twice as many for the no-responsibility group.

6. In conclusion, psychological interventions of this kind not only improve mood and attitudes; they seem to affect the very process of life and death itself.

13. (Par. 5) How were results 18 months later?

    a. Results perished   b. No change   c. Results remained   d. None of these

14. What was the most surprising finding of the study?

    a. None changed   b. Residents became brave

    c. Their plants made them live longer   d. None of these

15. Choose the correct conclusion from the options given below.

    a. Residents can be changed   b. Psychological interventions help residents

    c. People will not die   d. None of these

16. When we read only to find the answer, this technique is called.

    a. Skimming   b. Scanning   c. Churning   d. Wringing

17. When we read by skipping through sections of a passage, this technique is called.

    a. Skimming   b. Scanning   c. Churning   d. Wringing

18. When we read only the headings to identify the answer, this technique is called.

    a. Skimming   b. Scanning   c. Churning   d. Wringing

19. Which technique helps you to read up to 1000 words a minute?

    a. Skimming   b. Scanning   c. Churning   d. Wringing

20. Which technique is very useful to identify which section of a passage is to be read?

    a. Skimming   b. Scanning   c. Churning   d. Wringing

21. In the 5 stages of listening process which stage is 'remembering'?

    a. Stage 1   b. Stage 2   c. Stage 3   d. Stage 4

22. In the 5 stages of listening process which stage is 'receiving'?

    a. Stage 1   b. Stage 2   c. Stage 3   d. Stage 4

23. In the 5 stages of listening process which stage is 'understanding'?

    a. Stage 1   b. Stage 2   c. Stage 3   d. Stage 5

24. In the 5 stages of listening process which stage is 'evaluating'?

    a. Stage 4   b. Stage 1   c. Stage 3   d. Stage 5

25. In the 5 stages of listening process which stage is 'responding'?

    a. Stage 4   b. Stage 1   c. Stage 3   d. Stage 5

26. What is the barrier of listening called if a person has hearing problems?

    a. Egotism   b. Rapid thoughts   c. Impaired hearing   d. None of these

27. What is the barrier of listening called if a person's mind wanders onto topics which are not related to speaker's words?

    a. Egotism   b. Rapid thoughts   c. Impaired hearing   d. None of these

28. What is the barrier of listening called if a person is given a lot of information to receive?

    a. Egotism   b. Rapid thoughts   c. Overloaded messages   d. None of these

29. What is the barrier of listening called if a person cannot understand the accent spoken by the speaker?

    a. Faulty assumptions   b. Cultural differences c. Egotism   d. None of these

30. What is the barrier of listening called if a person thinks listening is merely a passive activity?

    a. Faulty assumptions   b. Cultural differences c. Egotism   d. None of these

31. P5QR, P4QS, P3QT, _____, P1QV

    a. 2PQW   b. PQV2   c. P2QU   d. PQ3U

32. QPO, NML, KJI, _____, EDC

    a. HGF   b. CAB   c. JKL   d. GHI

33. SCD, TEF, UGH, _____, WKL

    a. CMN   b. UJI   c. VIJ   d. IJT

34. ELFA, GLHA, ILJA, _____, MLNA

    a. OLPA   b. KLMA   c. LLMA   d. KLLA

35. In a certain code, SIKKIM is written as THLJJL, how is TRAINING written in that code?

    a. SQBHOHOF   b. UQBHOIOF   c. UQBHOHOI   d. UQBHOHOF

36. if COMPLETED is coded as MOCELPDET, then DIRECTION will be coded as:

    a. RIDTCENOJ   b. SIDTCENOI   c. RIDTCENOI   d. RIETCENOI

37. FAT+THAT=APPLE, What is A+L+T?

    a. 13   b. 10   c. 11   d. 9

38. SEND+MORE=MONEY, What is M+O+N+E+Y?

    a. 11   b. 12   c. 13   d. 14

39. BASE+BALL=GAMES, What is G+A+M+E+S?

    a. 21   b. 23   c. 25   d. 29

40. LETS+WAVE=LATER, What is L+A+T+E+R?

    a.12   b. 13   c. 14   d. 15

41. DONALD+GERALD=ROBERT. What is R+O+B+E+R+T?

    a. 22   b. 24   c. 26   d. 2

42. SCD, TEF, UGH, _____, WKL

43. FAG, GAF, HAI, IAH, ____

     a. JAK   b. HAI   c. HAI   d. HAI

44. PRAG : QTDK : : STOP : ?

     a. LMNP   b. BDFF   c. QSTG   d. TVRT

45. ELF+ELF=FOOL. What is F+O+O+L?

     a. 11   b. 12   c. 13   d. 14

46. ROADS+CROSS=DANGER. What is D+A+N+G+E+R?

     a. 28   b. 31   c. 33   d. 35

47. RAB, SCD, TEF, _____, VIJ

     a. GVH   b. UGH   c. UVG   d. HGU

48. SRQ, PON, MLK, _____, GFE

     a. IJH   b. JIH   c. JHI   d. IHJ

49. KEL, LFM, MGN, NHO, OIP, _____

     a. JPO   b. PJO   c. PJQ   d. None of these

50. E2HI, _____ _____, EHI4, E5HI, EH6I

     a. EH3I   b. EI3H   c. I2E3H   d. None of these

51. The students who apply to Engineering colleges drop out because of lack of guidance.

     a. True   b. False   c. Neutral   d. Not Applicable

52. The students are not responsible for the decisions that they take to join Engineering.

     a. True   b. False   c. Neutral   d. Not Applicable

53. There is a massive difference between what a college expects than a school from its students.

     a. True   b. False   c. Neutral   d. Not Applicable

54. The students must have clear picture of what they want to become after engineering right from 1st year of Engineering.

     a. True   b. False   c. Neutral   d. Not Applicable

55. The students must not approach the library for referring to books which is prescribed in the syllabus.

     a. True   b. False   c. Neutral   d. Not Applicable

56. An Engineer, in order to be performing well in their career must have only technical knowledge.

     a. True   b. False   c. Neutral   d. Not Applicable

57. Engineers are the reasons for which the commerce, trade and marketing has experienced drastic improvement.

     a. True   b. False   c. Neutral   d. Not Applicable

58. In order to be an effective Engineer, one must pay closer and keen attention to minutest details.

      a. True   b. False   c. Neutral   d. Not Applicable

59. Engineers do not require leadership as well as management skills.

      a. True   b. False   c. Neutral   d. Not Applicable

60. Engineers know the value of time.

      a. True   b. False   c. Neutral   d. Not Applicable

61. _____ mom is on the phone.

      a. You   b. Your   c. You're   d. Yours

62. _____ looking a lot better than you did.

      a. You   b. Your   c. You're   d. Yours

63. If _____ in town, come by and see us.

      a. you   b. your   c. you're   d. yours

64. If you do it again _____ certain to get sent to the office.

      a. you   b. your   c. you're   d. yours

65. Was it _____ brother I saw last week?

      a. you   b. your   c. you're   d. yours

66. I hope that _____ happy in your new job.

      a. you   b. your   c. you're   d. yours

67. I hope you get lots of presents on _____ birthday.

      a. you   b. your   c. you're   d. yours

68. _____ not going out looking like that.

      a. You   b. Your   c. You're   d. Yours

69. I'm coming over to _____ house to sort this out.

      a. you   b. your   c. you're   d. yours

70. Do you know where _____ going?

      a. you   b. your   c. you're   d. yours

71. The applause showed how deeply the presentation had _____ the audience.

      a. affect   b. effect   c. affected   d. effected

72. His attitude was _____ by his upbringing.

      a. affect   b. effect   c. affected   d. effected

73. No matter what he does, it will have no _____ on me.

    a. affect   b. effect   c. affected   d. effected

74. No matter what he does, it will not _____ . . . me.

    a. affect   b. effect   c. affected   d. effected

75. How was the team _____ by the loss of their coach?

    a. affect   b. effect   c. affected   d. effected

76. What is the type of introduction called, when it is required to introduce yourself in quick time frame?

    a. Self-introduction   b. Group introduction   c. Elevator introduction   d. None of these

77. Choose the best option which suits the best for professional introduction.

    a. Dress appropriately   b. Keep eye contact   c. Be confident   d. All of these

78. A non – formally prepared speech is called.

    a. Extempore speaking   b. Presentation   c. Debate   d. None of these

79. Which of these element is not involved in the process of communication?

    a. Pipe   b. Sender   c. Message   d. Channel

80. Which of these is the third element of communication?

    a. Sender   b. Receiver   c. Channel   d. Message

81. Which of these is the most important tool of communication?

    a. Body language   b. Gestures   c. Language   d. Posture

82. Which of these must be avoided in any presentation?

    a. Proper grammar   b. Complex words   c. Short sentences   d. Clear voice

83. Which of these is not important in an oral presentation?

    a. Words   b. Body language   c. Gestures   d. Audience size

84. Which of these is the best way to establish a proper rapport with audience?

    a. Pointing finger   b. Making eye contact   c. Waving hands   d. Standing erect

85. In an oral presentation, the speaker should not _____

    a. Panic   b. Pause   c. Making eye contact   d. Inspire

86. Which number among the following is divisible by 7?

    a. 77754   b. 7666   c. 77784   d. 5643

87. Which number among the following is divisible by 8?

    a. 762928   b. 220953   c. 19537455   d. None of these

88. Which number among the following is divisible by both 7 and 11?

    a. 4540074   b. 293076   c. 1793498   d. 5740702

89. Which of the following number is divisible by 63?

    a. 492815   b. 4107872   c. 5893407   d. 6221628

90. Which number is divisible by 18?

    a. 52794   b. 432181   c. 1725516   d. None of these

91. What is the unit digit in the product $(365 \times 659 \times 771)$?

    a. 1   b. 2   c. 4   d. 6

92. What is the unit digit in 7105?

    a. 1   b. 5   c. 7   d. 9

93. How many 3-digit numbers are completely divisible 6?

    a. 140   b. 150   c. 151   d. 166

94. $(112 + 122 + 132 + ... + 202) = $?

    a. 398   b. 2485   c. 4232   d. 1563

95. What is the unit digit in $(795 - 358)$?

    a. 0   b. 4   c. 6   d. 7

96. What will be remainder when 17200 is divided by 18?

    a. 17   b. 16   c. 1   d. 2

97. When a number is divided by 13, the remainder is 11. When the same number is divided by 17, then remainder is 9. what is the number?

    a. 339   b. 349   c. 369   d. none of these

98. In a division sum, the divisor is 10 times the quotient and 5 times the remainder. If the remainder is 46, what is the dividend?

    a. 4236   b. 4036   c. 4336   d. 5336

99. On dividing a number by 357, we get 39 as remainder. On dividing the same number 17, what will be the remainder?

    a. 0   b. 3   c. 5   d. 11

100. On dividing a number by 5, we get 3 as remainder. What will the remainder when the square of the number is divided by 5?

    a. 0   b. 1   c. 2   d. 4

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours   Max Marks: 100 marks

SUB: ENGINEERING PHYSICS

Q P Code: 60003

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. write the same question numbers as they appear in this question paper.
5. Write Legibly

MODULE – 1

1.	a.	Define damped oscillations and forced oscillations with examples.	4 marks
	b.	Describe the construction and working of Reddy Shock tube.	6 marks
	c.	Define simple harmonic motion. Derive the equation for simple harmonic motion using Hooke's law.	6 marks
	d.	Evaluate the resonance frequency of a spring of force constant 2467 N/m, carrying a mass of 100 gm.	4 marks

OR

2.	a.	Define Mach number. Write the applications of shock waves.	6 marks
	b.	Discuss the theory of forced vibrations and hence obtain the expression for amplitude.	10 marks
	c.	Find the frequency of oscillation of a free particle executing simple harmonic motion of amplitude 0.35 m if the maximum velocity it can attain is 220 m/s.	4 marks

MODULE – 2

3.	a.	Define young's modulus, bulk modulus and rigidity modulus and derive a relation between them.	8 marks
	b.	Define bending moment of a beam. Derive an expression for bending moment $\left(B.M = \left(\frac{Y}{R}\right)Ig\right)$	8 marks
	c.	A wire length 1 m and diameter 1 mm is clamped at one of its ends. Calculate the couple required to twist the other end by 90. Given rigidity modulus = 2.8×10^{10} N/m².	4 marks

OR

4.	a.	State Hooke's law of elasticity. Derive an expression for young's modulus Y of a material of a single cantilever.	10 marks
	b.	What are torsional oscillations? Mention the expression for couple per unit twist of a solid cylinder and expression for period of oscillation.	6 marks
	c.	A solid lead sphere of radius 10.3 m is subjected to a normal pressure of 10 N/m² acting all over the surface. Determine the change in its volume.	4 marks

MODULE – 3

5. a. Define lattice and basis. Explain seven crystal systems with neat diagram. **10 marks**
   b. Discuss different types of optical fibers with suitable diagrams. **6 marks**
   c. A monochromatic X-ray beam of wavelength 0.7 Å undergoes first order Bragg reflection from the plane (302) of cubic crystal at a glancing angle of 35°. Calculate the lattice constant **4 marks**

OR

6. a. Derive an expression for numerical aperture in terms of refractive index of core and cladding. **6 marks**
   b. Derive Bragg's law. **4 marks**
   c. Derive an expression for interplanar spacing of a crystal in terms of miller indices. **6 marks**
   d. Calculate the V-number and number of modes supported by an optical fiber of core index 1.54 and cladding index 1.5 at operating wavelength 1.3 μm. The diameter of the fiber is 50 μm. **4 marks**

MODULE – 4

7. a. Set up 1-dimensional time independent Schrodinger's wave equation and mention any two properties of wave function. **8 marks**
   b. Derive an expression for energy density at thermal equilibrium through Einstein's coefficients. **8 marks**
   c. An electron has a speed of 500 m/s correct up to 0.01 %. With what fundamental accuracy the position of the electron can be located? **4 marks**

OR

8. a. Show that the electron cannot exist inside the nucleus using Heisenberg's uncertainity principle. **6 marks**
   b. What is a laser? Describe the construction and working of CO_2 laser with the help of energy level diagram. **10 marks**
   c. A pulsed laser emits of pulses of 20 ns duration with an average power / pulse being 0.1 Mw. If the number of photons emitted per pulse is 6.981×10^{15}, calculate the wavelength of the laser. **4 marks**

MODULE – 5

9. a. Define Fermi level and Fermi factor. Write the assumptions of quantum free electron theory. **6 marks**
   b. Derive an expression for conductivity of semiconductors. **6 marks**
   c. What are polar and non polar dielectrics? **4 marks**
   d. The Fermi level in silver is 5.5 eV at 0^0K. Calculate the number of free electrons / unit volume. **4 marks**

OR

10. a. Obtain an expression for Fermi energy at 0^0 K. **6 marks**
    b. Derive Clausius-Mossotti equation. **6 marks**
    c. Discuss solid, liquid and gaseous dielectrics with examples. **4 marks**
    d. The following data are given for intrinsic germanium at 300 K. The electron and hole mobilities are 0.85 $m^2V^{-1}s^{-1}$ and 0.04 $m^2V^{-1}s^{-1}$. Find the resistivity of the sample if the intrinsic carrier concentration is 7×10^{12} m^{-3}. **4 marks**

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours   Max Marks: 100 marks

SUB: CIVIL ENGINEERING AND MECHANICS

Q P Code: 60005

Instructions: 1. Answer **five full** questions.
               2. Choose one full question from each module
               3. Your answer should be specific to the questions asked.
               4. Write the same question numbers as they appear in this question paper.
               5. Write Legibly

MODULE-1

1	a	With neat sketch explain different types of dams.	10 Marks
	b	Explain the role of Civil Engineer in Infrastructure development of the country	10 Marks

OR

2	a	Explain briefly any two scopes of Civil Engineering.	10 Marks
	b	Explain the Effect of Infrastructure on Socio-economic development a country	10 Marks

MODULE-2

3	a	Explain the basic idealization of Civil Engineering	10 Marks
	b	State and prove Varignon's Theorem	5 Marks
	c	A block weighing 10kN is resting on an inclined plane as shown in Fig.Q.3(c). Determine its components normal to and parallel to the inclined plane. The plane makes an angle 20° with the horizontal.	5 Marks
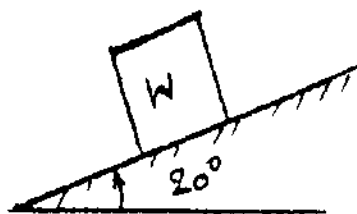
Fig.Q.3(c)

OR

4	a	State Law of Transmissibility of Forces, Law of superposition and Law of physical independence	6 Marks
	b	Define Force and its characteristics	4 Marks
	c	A body is subjected to the three forces as shown in Fig.Q.4(c). Determine the direction of the force F so that the resultant is in 'x' direction, when i) F=5000N ii) F=3000N.	10 Marks
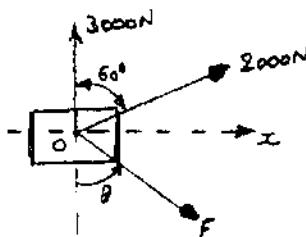
MODULE-3

5   a   Mention the equations of Equilibrium required for Coplanar concurrent and Coplanar non-concurrent system of forces   4 Marks

    b   State and Prove Lami's theorem   6 Marks

    c   Two spheres of radius 100mm and weight 5kN is in rectangular box as shown in Fig.Q5(c). Calculate the reactions at the point of contacts.   10 Marks
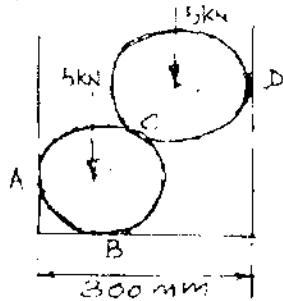

Fig.Q5(c)

OR

6   a   With neat sketch explain different types of Beams.   6 Marks

    b   What are statically determinate and indeterminate beams   4 Marks

    c   Determine the reactions for a cantilever beam fixed at 'A' and free at 'B' loaded shown in Fig.Q6(c).   10 Marks
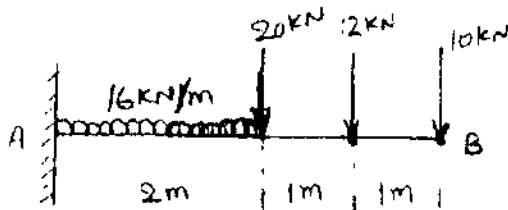
Fig.Q6(c)

MODULE-4

7   a   Derive the centroid of a Semicircle by the method of Integration.   8 Marks

    b   Locate the centroid of the plane shown in Fig.Q7(b)   12 Marks

Fig.Q.7(b)

OR

8   a   Determine radius of gyration of shaded area shown in Fig.Q8(a) about the axis AB.   12 Marks

$R200$

A —— B

400 150

All Dimensions are in MM

   b   State and prove Parallel axis theorem.   8 Marks

MODULE-5

9   a   Derive an expression for Greatest height reached by a particle and the time it takes   8 Marks

   b   A stone is dropped from the top of a tower 50m high. At the same time another stone is thrown up from the ground with a velocity of 25m/s. At what distance from the top and after how much time the two stones cross each other?   12 Marks

OR

10   a   What is super elevation? Mention its advantages and disadvantages.   8 Marks

   b   A cricket Ball is thrown from a height of 1.8m above the ground level at angle 30^0 with the horizontal with a velocity 12m/s and is caught by the fielder at a height of 0.6m above the ground. Determine the distance between the two players.   12 Marks

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)
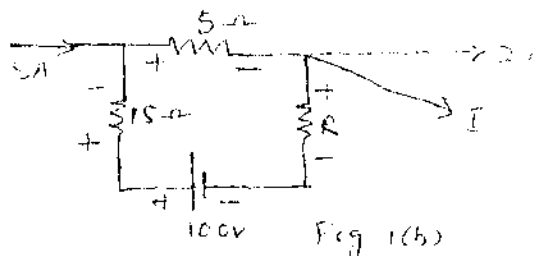
Time: 3 Hours

Max Marks: 100 marks

SUB: ELEMENTS OF MECHANICAL ENGINEERING

Q P Code: 60010

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. Write the same question numbers as they appear in this question paper.
5. Write Legibly

MODULE-1

1	a	Explain: (i) Hydroelectric Power Plant	10 marks
		(ii) Wind Power Plant.	
	b	List the Boiler Mountings and Accessories. Explain any four.	10 marks

OR

2	a	What are turbines? Explain Kaplan turbine with neat sketches.	12 marks
	b	Differentiate between Open and Closed cycle Gas Turbines.	08 marks

MODULE-2

3 a With PV diagram explain Otto cycle and Diesel Cycle   10 marks

b Following data were collected from a 4-stroke single cylinder oil   10 marks
engine at full load. Bore=200mm, stroke = 280mm, speed – 300rpm, indicated mean
effective pressure = 5.6 bar, torque on the brake drum=250 Nm, oil consumed= 4.2 kg/hr
and calorific value of oil = 41 MJ/kg. Determine mechanical efficiency, indicated thermal
efficiency and brake thermal efficiency.

OR

4	a	With a neat sketch explain the working of Vapour Absorption Refrigeration system	10 marks
	b	Draw neat sketch and explain the working of Domestic Air Conditioner	10 marks

MODULE-3

5	a	With neat sketches explain (i) Facing	10 marks
		(ii) Thread cutting	
		(iii) Reaming	
		(iv) Counter Sinking	
		(v) Boring.	

1 |

b   With neat sketches explain working Operations of   10 marks

(i) Surface Grinding

(ii) Centerless Grinding

OR

6   a   With a neat sketch explain Electric Arc Welding   10 marks

b   Differentiate between Soldering and Welding   10 marks

MODULE-4

7   a   Define (i) Velocity ratio   04 marks

(ii) Creep

(iii) Slip

(iv) Lubrication

b   Explain Idler and Stepped Cone drive mechanisms.   12 marks

c   Two mating gears have 30 and 45 involute teeth of module 12 mm and 20^0 pressure   04 marks
angle. Determine velocity ratio and centre distance between gears.

OR

8   a   Explain Ball bearings and Roller bearings with neat sketches   12 marks

b   Discuss any four properties of a good lubricant.   08 marks

MODULE-5

9   a   What are engineering materials? Classify and explain each.   06 marks

b   Write a short note on (i) Cast iron (ii) Steel   08 marks

c   Explain any three properties of polymeric materials   06 marks

OR

10   a   What are Matrix and Reinforcements? Explain the classification of Composite materials   08 marks

b   Explain the applications of Composites in Aircraft and automobile industries.   12 marks

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ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours

Max Marks: 100 marks

Sub: Basic Electrical Engineering

Q P Code: 60004

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. Write the same question numbers as they appear in this question paper.
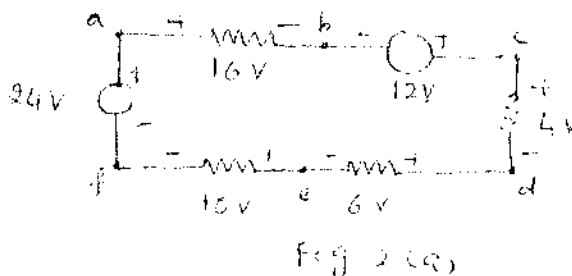5. Write Legibly

Module-1

1 a State and explain Ohms and mention any two limitations   6 Marks

b A portion of the network is shown in Fig 1(b) with the polarities as indicated. The voltage   8 Marks
across the 15Ω resistor if 30V. find the value of resistance R and the current I.

Fig 1(b)

c Define RMS value of an alternating quantity and derive the expression for the same.   6 Marks

OR

2 a In the network shown in Fig2(a), find the Voltages Vac, Vcc, Vac and Vad   6 Marks

Fig 2(a)

b Determine the current in all branches of the network shown in Fig2(c).   8 Marks

Fig 2(c)

c Define average value of an AC quantity and derive the expression for the same.   6 Marks

Module-2

3 a With circuit diagram and wave forms show that the average power is zero in pure resistance.   6 Marks

   b With circuit diagram and Phasor diagram derive the expression for Line Voltage and Current for a Star connected balanced load.   8 Marks

   c A balanced Star connected load of $(8 - j6)$ Ω|phase is connected to a 3-phase. 230V supply. Find the line current, powerfactor, active power and reactive power.   6 Marks

OR

4 a Show that the average power demand is never zero in case of series RL circuit with relevant circuit and waveforms.   6 Marks

   b Show that two wattmeters are sufficient to measure 3-phase power with relevant circuit and phasor diagram.   8 Marks

   c Three similar coils are connected in star takes a total power of 1.5kw at a p.f of 0.2 lagging from a 3-Θ, 00v, 50Hz supply. Determine the parameters of the circuit.   6 Marks

Module-3

5 a Explain the constructional features of various types of transformers.   8 Marks

   b A 400|230v, 50Hz single phase transformer is provided with 500 turns on LV side. Calculate   4 Marks
      (I)   No. of turns on the HV side
      (II)   Effective area of cross section of the core of the flux density to be less than $1.4wb/m^2$

   c What do you mean by Electric Shock? With neat diagram. explain the pipe earthing?   8 Marks

OR

6 a Derive the condition for maximum efficiency for a transform   6 Marks

   b A single phase 20KVA transformer has 1000 primary and 2500 secondary turns. The net cross sectional area in 100 cm^2. When the primary winding is connected to 500V, 50Hz supply. Calculate the following   6 Marks
      (I)   The maximum value of flux density
      (II)   The secondary induced voltage
      (III)   Primary and secondary full load currents

   c With circuit diagram and truth table. Explain the operation of three way control of lamps   8 Marks

Module-4

7   a   Derive the EMF equation of a DC generators   6 Marks

    b   Explain the various characteristics of a DC shunt motor   8 Marks

    c   A 4 pole DC Shunt motor takes22.5A from a 250V supply. The armature resistance is   6 Marks
        0.5Ω and shunt field resistance in 125Ω. The armature is wave wound with 300
        conductors. If the flux/pole is 0.02wbs. Calculate (I) Speed (II) Torque developed and
        (III) power developed.

OR

8   a   What is a dc generator? What is the basic principle on which it is working? Give the   6 Marks
        classification of DC generators.

    b   Explain the various characteristics of series motor with relevant diagrams.   8 Marks

    c   A series motor runs at 600rpm when taking a current of 110A from a 230V supply. Given   6 Marks
        that R_a=012Ω, R_{se}= 0.03Ω. the useful flux pole for 110A is 0.024wb and that for 50A is
        0.0144wbs. Calculate the speed when the current has fallen to 50A.

Module-5

9   a   Explain the constructional features of various types of synchronous generators.   8 Marks
    b   What is an IM? Explain the principle of operation   6 Marks
    c   A 3 phase IM is wound for 8 poles if the full load slip is 2.5%. Calculate   6 Marks
            (I)   Synchronous speed
            (II)   Slip Speed
            (III)   Rotor speed
            (IV)   Rotor frequency

OR

10 a   With usual notations, derive an expression for the induced voltage for a synchronous   6 Marks
        generator

    b   What is a slip? Explain its significance   6 Marks

    c   An 8 pole alternator runs at 750 rpm and supplies power to a 6 pole IM which has a full   8 Marks
        load slip of 3%. Find the full load speed of the motor and frequency of rotor emf.

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ADICHUNCHANAGIRI UNIVERSITY   18ELE13/23

First Semester BE Examination July 2021

(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: Basic Electrical Engineering

Q P Code: 60004/60014

Instructions: 1. Answer five full questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. write the same question numbers as they appear in this question paper.
5. Write Legibly

Module – 1

1	a	State and explain Ohm's law and mention its limitations.	6 marks
	b	Derive an expression for the equivalent resistance of three resistors which are connected in series and also explain the characteristics of series circuits.	8 marks
	c	A 8 ohm resistor is in series with a parallel combination of two resistors 12 ohm and 6 ohm. If the current in the 6 ohm resistor is 5A.determine the total power dissipated in the circuit.	6 marks

OR

2	a	State and explain the Kirchhoff's laws with an example	7 marks
	b	Define RMS value of alternating current Show that its value is proportional to maximum value.	7 marks
	c	Define the following with respect to sinusoidal alternating quantity: (i) Average Value, (ii) Form factor and, (iii) peak factor	6 marks

Module – 2

3	a	Show that in a pure inductor the current lag behind the voltage by 90°. Also draw the voltage and current waveforms.	6 marks
	b	A 230 V, 50 Hz ac supply is applied to a coil of 0.06H inductance and 2.5Ω resistance connected in series with a 6.8μF capacitor. Calculate (i) Impedance (ii) Current (iii) Phase angle between current and voltage (iv) power factor (v) power consumed.	7 marks
	c	Obtain the relationship between line and phase voltages and currents in three phase balanced delta connected system	7 marks

Or

4	a	List out the advantages of three phase system as compared to single phase system	6 marks
	b	Show that two wattmeter's measure three phase power with suitable circuit diagram and vector diagrams.	8 marks
	c	A coil of resistance 10, and inductance 1.013 H, is connected in series with a 10 μ F capacitor. Calculate (a) the resonant frequency, (b) the circuit current, when connected to a 240 V, 50 Hz supply, and (c) the P.D. developed across the capacitor	6 marks

Module – 3

5	a	Explain the working principle of transformer.	6 marks

PTO

b List different types of loss in transformer and explain each one in brief. — 8 marks

c A 250KVA, 11000/415V,50Hz single phase transformer has 80 turns on secondary. Calculate. (i)The rated primary and secondary currents (ii)The number of primary turns (iii)The maximum value of flux (iv)Voltage induced per turn — 6 marks

Or

6 a What is earthing? Why earthing is required? With the help of sketch Explain plate earthing. — 8 marks

b With a neat sketch and truth table explain 2 way and 3 way control of lamp. — 8 marks

c What are the Precautions against electric shock? — 4 marks

Module – 4

7 a Explain the working principle of D.C motor with suitable diagrams. — 6 marks

b Derive an EMF equation for D.C generator with usual notations — 6 marks

c A shunt generator delivers 195A at terminal voltage of 250V. The armature resistance and shunt field resistance are 0.02Ω and 50Ω respectively. The iron and friction losses equal 950W. Find
(i) E.M.F generated (ii) Cu losses (iii) output of the prime motor (iv) commercial, mechanical and electrical efficiencies. — 8 marks

Or

8 a Discuss the following characteristics for i) series motor ii) shunt motor with relevant plots. i) Ta v/s Ia ii) N v/s Ia — 8 marks

b Explain the function of following parts of D.C machine. — 6 marks
i) Yoke ii) Field winding iii) Commutator
iv) Pole shoe v) Pole core vi) Brush

c A 500V shunt motor has 4 poles and a wave connected winding with 492 conductors. The flux per pole is 0.05Wb.the full load current is 20 Amps. The armature and shunt field resistances 0.1Ω and 250Ω respectively. Calculate the speed and the developed torque. — 6 marks

Module – 5

9 a Explain the working principle of 3phase synchronous generator. — 6 marks

b Derive an EMF equation for alternator with suitable considerations — 8 marks

c A 3-phase, 12-pole alternator is coupled to an engine running at 500rpm. The alternator supplies an induction motor which has a full-load speed of 1455rpm.find the slip and number of poles of the motor — 6 marks

Or

10 a Describe the constructional features of 3 phase induction motor with suitable diagrams — 8 marks

b With a circuit diagram explain the working of a star delta starter for a three phase induction motor — 7 marks

c A 3 phase, 6 pole, star connected alternator has 48 slots and 12 conductors per slot on the armature. If the rotor at 1200rpm and Flux per pole is 0.3Wb. The winding factor and pitch factor is 0.95. Calculate the phase e.m.f and line e.m.f. — 5 marks

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ADICHUNCHANAGIRI UNIVERSITY
18EME15/25

First/Second Semester BE Examination July 2021

(CBCS Scheme)

Time: 3 Hours

Max Marks: 100 marks

Sub: Elements of Mechanical Engineering

Q P Code: 60010/60019

Instructions: 1. Answer five full questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. write the same question numbers as they appear in this question paper.
5. Write Legibly

Module – 1

1	a	Explain with a neat sketch working of Solar Power Plant	10 marks
	b	Define any five steam properties	10 marks

OR

2	a	Explain with a neat sketch working of Kaplan Turbines	10 marks
	b	Explain with a neat sketch working of Open cycle Gas Turbine	10 marks

Module – 2

3	a	Using PV diagram explain Diesel cycle	10 marks
	b	Following data are collected from a 4-stroke single cylinder oil engine at full load. Bore=200 mm, stroke = 280 mm, speed = 300 rpm, indicated mean effective pressure = 5.6 bar, torque on the brake drum=250 Nm, oil consumed = 4.2 kg/h and calorific value of oil = 41 MJ/kg. Calculate mechanical efficiency, indicated thermal efficiency and brake thermal efficiency.	10 marks

Or

4	a	Define the following	10 marks
		i. Refrigerating Effect	
		ii. Ton of Refrigeration	
		iii. Unit of Refrigeration	
		iv. Coefficient of Performance	
		v. Ice Making capacity	
	b	Describe with a neat sketch the working of vapour Compression refrigerator.	10 marks

Module – 3

5	a	Explain the following operations with neat sketch	12 marks
		(i) Knurling (ii) Counter Sinking (iii) Thread cutting	
	b	Explain Cylindrical Grinding with a neat sketch	08 marks

Or

6	a	Define Brazing and explain its working principle	10 marks
	b	Distinguish between the welding and Brazing	10 marks

Module – 4

7 a Explain any 5 advantages of gear drives over belt drives   10 marks

   b Explain with a neat sketch working of Idler Pulley   10 marks

Or

8 a Explain any 5 properties of a good lubricant   .   10 marks

   b Explain Ball & Roller Bearings   10 marks

Module – 5

9 a Differentiate between Ferrous and non-Ferrous metals   10 marks

   b Define Engineering materials and explain the composition and applications of any   10 marks
      three types of steel

Or

10 a Broadly classify composite materials   10 marks

    b What are the advantages and disadvantages of composite materials   10 marks

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ADICHUNCHANAGIRI UNIVERSITY

First/Second Semester BE Examination October 2021   18PHY12/22

(CBCS Scheme)

Time: 3 Hours

Max Marks: 100 marks

Sub: Engineering Physics

Q P Code: 60003/60013

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked.
4. write the same question numbers as they appear in this question paper.
5. Write Legibly

Module – 1

1	a	Define SHM. Starting from Hooke's law derive the differential equation for SHM. Mention the characteristics of SHM.	08 marks
	b	Describe construction and working of Reddy shock tube. Give any two applications.	08 marks
	c	In a spring mass system, the spring is compressed to 1.6 cm on loading mass of 98 kg. Calculate spring constant of the spring.	04 marks

OR

2	a	What are forced oscillations? Derive expression for amplitude and phase of forced oscillations.	10 marks
	b	Discuss the basics of law of conservation of energy, mass and momentum.	06 marks
	c	In a shock tube experiment, it was found that, the shock waves are produced with Mach number 2. The distance between two pressure sensors in a shock tube is 170 mm. In what time the shock waves travel the distance between the sensors? Speed of sound is 340 ms^{-1}.	04 marks

Module – 2

3	a	Derive relation between Y, K and σ	8 marks
	b	Describe single cantilever. Derive the expression for Young's modulus of the material of rectangular beam.	8 marks
	c	In stretching experiment, the extension produced in a wire of a load 2.5 kg is 0.45 cm. The length of the wire is 2 m and its radius is 0.013 cm. Find Young's modulus of the wire.	4 marks

Or

4	a	Define the different moduli of elasticity. Describe strain coefficients.	8 marks
	b	What are Torsional oscillations? Derive expression for couple per unit twist of a cylinder.	8 marks
	c	Calculate the angular twist of a wire of length 0.3m and radius 0.2x10^{-3}m, when a torque of 5x10^{-4} Nm is applied. Rigidity modulus = 8x10^{10} Nm^{-2}.	4 marks

PTO

Module – 3

5 a What is space lattice? Describe briefly the Seven Crystal System, with neat diagrams. 08 marks

b What is numerical aperture? Obtain an expression for numerical aperture in an optical fiber 08 marks

c Draw the following planes in a cubic unit cell (100), (110), (011) and (111) 04 marks

Or

6 a Define coordination number and packing factor. Calculate the APF for SC, BCC and FCC. 10 marks

b Discuss the types of attenuation in optical fiber. 06 marks

c First order spectrum is formed when X-rays of wavelength 1.5 Å is incident on a crystal at 12°. Calculate the interplanar spacing of the crystal. 04 marks

Module – 4

7 a State and explain Heisenberg's uncertainty principle. Mention its significance. 6 marks

b Describe construction and working of CO_2 laser using energy level diagram. 10 marks

c The ratio of population of two energy levels is 1.059×10^{-30}. Find the wavelength of light emitted at 330K. 4 marks

Or

8 a Set up one dimensional Schrodinger's time independent equation. 8 marks

b Obtain expression for energy density using Einstein's coefficients. 8 marks

c The speed of electron is measured to within an uncertainty of 2.2×10^4 ms^{-1} in one dimension. What is the minimum width required by electron to be confined in atom? 4 marks

Module – 5

9 a Give the assumptions of Quantum free electron theory. Discuss two success of QFET. 8 marks

b What are dielectrics? Explain types of polarization. 8 marks

c The dielectric constant of Sulphur is 3.4. Assuming a cubic lattice for its structure, Calculate the electronic polarizability of Sulphur if it has 3.89×10^{28} atoms/m^3. 4 marks

Or

10 a Derive expression for electrical conductivity of a Semiconductor. 8 marks

b Derive expression for Fermi energy at temperature 0 K. 8 marks

c Calculate the probability of an electron occupying an energy level 0.02 eV above the Fermi level at 400K. 4 marks

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ADICHUNCHANAGIRI UNIVERSITY

18EGH28

Second Semester BE Degree Examination July 2021
(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: ENGLISH II

Q P Code: 60011

Instructions: 1. Your answer should be specific to the questions asked.
      2. write the same question numbers as they appear in this question paper.
      3. Write Legibly

Question Paper Version – A

Answer all the questions   **100X1=100**

1   Employees desire professionals who do which of the following?

   A. Treat others respectfully only when they deserve it
   B. Speak their minds and talks over others
   C. Listen actively, honor commitments, and seek help when needed
   D. Discuss personal issues with coworkers

2   Your emails should be generally:

   A. Brief and to the point, but well-written   B. Long and vague
   C. Riddled with errors   D. Passage

3   When you get a personal phone call in a meeting, you:

   A. Ignore it and call them back later
   B. Excuse yourself and take it outside briefly
   C. Answer and have a loud conversation
   D. None of the above

4   Unlike social etiquette, office and bussiness etiquette are primarly based on

   A. Hierarchy and power   B. Personal relation
   C. Common sense   D. Option A and C

5   Your friend from college joins your company in a superior role to you. How should you interact with her in the office?

   A. Talk informally and don't take her seriously
   B. Show jealousy
   C. Break friendship ties and maintain only professional relationship
   D. Treat her like a superior in the office and as a friend outside

6   The key elements of presentation are:

   A. Presenter   B. The message and the medium
   C. Duration and time   D. All of the above

7   Topic identification is level one reqiuirement for a formal presentation

   A. Yes   B. No
   C. Maybe   D. Both a and c

8   How many pumps does a proffesional handshake require?

   A. 3   B. 4
   C. 5   D. Two and a grab of the forearm

PTO

9   A text is more efficient than an email when letting someone know you are running behind.

A. True   B. False
C. Maybe   D. None of the above

10   Is the most important thing you must do before you leave a party?

A. Get business card from a new contact
B. Ask for a doggie bag
C. Say goodbye to the host
D. Both A and C

11   What does the outdated term "turning the table" mean?

A. Talk to the person on your left side during the first course, and rotate sides after each course
B. Move the table to be closer to the dessert buffet
C. Change seating throughout the course of a dinner party
D. None

12   During an in-person conversation, what percent of your message is delievered through your spoken words?
A. 7%   B. 38%
C. 55%   D. 43%

13   When is the most gracious time to respond to an invitation?

A. Within 24 hours of receiving the invitation
B. Within one week of receiving the invitation
C. Anytime
D. Both A and C

14   You can tell a lot about a person by their handshake. The double handshake, (where the person places their second hand on top of yours), is likely to be used by

A. Someone who tends to dominate in the meetings
B. Someone who is submissive
C. Someone who trusts you and wants you to trust them
D. None   •

15   Eye contact is an important part of communication, and a lack of it can imply deception. To avoid staring at somebody, how can you naturally strike a balance?

A. When breaking eye contact, look to the left or to the right
B. Look down at the floor every 30 seconds or so
C. Look just past the person
D. None

16   When you stand up to talk in front of a group of people, what can you do to exude confidence?

A. Strike a wide stance
B. Try to position a desk or table between you and your audience
C. Clasp your hands in front of you
D. Both A and B

17   Which of these signals suggest the person you are speaking to might not be telling the whole truth?
A. They make steady eye contact
B. They make frequent hand to face touches, including attempts to cover their mouth
C. They answer you fairly promptly
D. Both A and C

18   You need to ask some tough questions about your team's performance, and you notice that your team leader's leg is shaking. Does that suggest?

A. He's feeling bored by the conversation
B. He's feeling jittery about your line of questioning
C. He is exuding confidence
D. None

19   While addressing a senior member of your team about staffing changes, she suddenly crosses her arms.

Do you take that to mean?
A. She suddenly feels cold
B. She's not sure what to do with her hands
C. She is feeling defenseless, and is trying to shut out what is being proposed
D. None

20   Using your hands while you talk can communicate a range of meanings, from enthusiasm and passion, to a lack of control. What would calm rounded hand gestures say to you?
A. "i'm open and clear"
B. "i think i'm in trouble"
C. "i'm feeling over the moon"
D. None

21   Listening means to respond to advice or request

A. True   B. False   C. Maybe   D. None

22   Which of these is not a step in the listening process?

A. To stop talking   B. Receiving
C. Misinterpreting   D. Responding

23   Which of these is the first step in the listening process?

A. Stop talking   B. Receiving
C. Interpreting   D. Responding

24   Which of these is the third step in the listening process?

A. Stop talking   B. Interpreting
C. Responding   D. Receiving

25   _____ Is the last step of the listening process.

A. Receiving   B. Interpreting
C. Responding   D. Stop talking

26   Hearing means perceiving with ears.

A. True   B. False   C. Maybe   D. None

27   Which of these is not a type of listening?

A. Appreciative listening   B. Superficial listening
C. Focused listening   D. Musical listening

28   Which of these types of listening lacks depth?

A. Appreciative listening   B. Superficial listening
C. Focused listening   D. Evaluative listening

29   In which of these types of listening, does the listener feel grateful?

A. Superficial listening   B. Attentive listening
C. Appreciative listening   D. Evaluative listening

30   Which of these types of listening is followed by skilled listeners?

A. Focused listening   B. Evaluative listening
C. Attentive listening   D. Empathetic listening

31   In which of these, the listener puts himself in place of the speaker?
A. Focused listening   B. Evaluative listening
C. Attentive listening   D. Empathetic listening

32   Body language can make or break a speech

A. True   B. False   C. Maybe   D. None

33   Which of these is the study and classification of speech sounds?
A. Gestures   B. Speech style
C. Phonetics   D. Spoof

PTO

34   Which of these is not an element of the speaking technique?

A. Voice quality   B. Word stress
C. Appearance   D. Correct tones

35   Which of these means giving emphasis to a syllable

A. Voice quality   B. Word stress
C. Tone   D. Message

36   Which of these factors is not involved in the determination of correct tone?

A. Pitch   B. Dressing style
C. Quality   D. Strength

37   Which of these is not a type of tone?

A. Urgent tone   B. Serious tone
C. Restrained tone   D. Jumping tone

38   Which of these tones represent thoughtfulness?

A. Serious tone   B. Urgent tone
C. Happy tone   D. Outraged tone

39   Which of these tones is an unemotional tone?

A. Happy tone   B. Outraged tone
C. Restrained tone   D. Humorous tone

40   _____ Tone is used when speaker wants to bring about a good impression of her life.

A. Outraged   B. Reflective
C. Restrained   D. Urgent

41   On is used in speaking of things in motion.

A. True   B. False   C. Maybe   D. None

42   Fill in the blank. The dog sprang ____ him.

A. On   B. Upon   C. In   D. Over

43   Till is used for time.

A. True   B. False   C. Maybe   D. None

44   Which of these comes immediately after the noun?

A. Adverb phrase   B. Adjective phrase
C. Verb phrase   D. Pronoun phrase

45   Which of these statements is false?

A. The subject should usually follow the verb.
B. The object usually comes after the verb.
C. When there is an indirect object and a direct object, the indirect precedes the direct.
D. When the adjective is used attributively it comes before the noun which it qualifies.

46   Every statement must have a subject and a _____

A. Noun   B. Verb   C. Predicate   D. Phrase

47   Choose the correct statement.

A. Do not make friend with selfish people.
B. Do not make friendship with selfish people.
C. Do not make friends with selfish people.
D. Do not make friendly with selfish people.

48   Choose the correct statement.
A. She doesn't know the reason for his disappearance.
B. She doesn't know the reason of his disappearance.
C. She doesn't know the reason at his disappearance.
D. She doesn't know the reason with his disappearance

49   Some students are ____ at copying.
A. Adapt   B. Adept   C. Adopt   D. Edept

50   Father _____ me not to go out in the cold.

A. Advised   B. Advised   C. Advice   D. Advise

51   Fill in the blank. I advised her _____ drink it.

A. Don't   B. Not to   C. To not   D. To don't

52   Choose the correct statement.

A. He obtained passing marks.   B. He obtained pass marks.
C. He obtained passed marks.   D. He obtained passing mark.

53   Choose the correct statement.

A. Anil talks french well.   B. Anil chats french well.
C. Anil speaks french well.   D. Anil talk french well.

54   Choose the correct statement.
A. The ship was drowned.   B. The ship drowned.
C. The ship sank.   D. The ship had sank

55   Choose the correct statement

A. It is they who has to leave this place.
B. It is they who have to leave this place.
C. It is them who has to leave this place.
D. It is them who have to leave this place

56   Fill in the blank.
Offerings made upon the ____
A. Altar   B. Alter   C. Altar   D. Alter

57   Which of the following statements is incorrect?

A. A letter must be written in one single paragraph.
B. A letter must be complete in all respects.
C. A letter must be written in legible handwriting.
D. A letter must be properly punctuated.

58   Which of these is an example of courteous leave taking?

A. Yours sincerely   B. Yours sincerely,
C. Yours sincerely   D. Sincerely

59   Where should the signature of the writer be placed?

A. Above the courteous leave taking
B. Below the courteous leave taking
C. Next to the courteous leave taking
D. On the envelope

60   What is the information endorsed on the envelope?

A. Name   B. Address   C. Name and address   D. Name and date

61   In the following question, choose the correct code form.
If 'air' is called 'green', 'green' is called 'red', 'red' is called 'sea', 'sea' is called 'blue', 'blue' is called 'water' and 'water' is called 'pink', then what is the color of grass?

A. Green   B. Air
C. Red   D. Pink

62   In the following question, choose the correct code form.
According to new terminology, 'aries' means 'air', 'taurus' means 'light', 'libra' means 'water' and 'scorpio' means 'earth'. What would an organism breathe in?

A. Aries   B. Taurus   C. Libra   D. Scorpio

63   Choose the word which is least like the other words in the group.

A. Grenade   B. Katana
C. Shotgun   D. Rifle   **PTO**

64   Choose the word which is not similar to the other words in the group.

A. Peas B. Cabbage C. Spinach
D. Tomato

65 Solve the following question and choose the correct alternative from the following.
1, 2, 3, 4, and 5 are sitting in row but not necessarily in that order.
All of them are sitting in a row with their backs toward north.
3 is immediate right to 5 and 4 is immediate left to 1. Only 2 is between 1 and 5.
Which of the following are at the extreme ends?
A. 3, 4 B. 2, 5 C. 2, 1 D. 4, 5

66 In the following question, choose the correct code form.
If, in a language, 'one' is called 'two', 'two' is called 'three', 'three' is called 'four', 'four' is called 'five' and 'five' is called 'six'.
Then what is the square of number 2?
A. Three B. Four C. Five D. Six

67 If 'dog' is called 'lion', 'lion' is called 'bison', 'bison' is called 'snake', 'snake' is called 'mongoose', 'mongoose' is called 'crocodile', then which one is reared as pet?

A. Lion B. Bison C. Snake
D. Mongoose

68 Choose the word which is least like the other words in the group.
A. Timor B. India
C. Rhodes D. Borneo

69 Choose the word which is not similar to the other words in the group.

A. Bonnet B. Fender
C. Dashboard D. Hubcap

70 Read the following information to answer the given question.
Five brothers are standing in a row facing north.
Tony is not adjacent to bony or mony. Sony is not adjacent to bony. Tony is adjacent to dony. Dony is at the middle in the row.
Then, which pair is at the extreme ends?
A. Tony, dony B. Dony, bony
C. Sony, mony D. Mony, tony

71 Read the following information to answer the given question.
There are seven monkeys sitting in a row - annie, bonnie, connie, donnie, earnie, fernie and genie.
Genie is to the right of donnie and to the left of bonnie.
Annie is on the right of connie.
Annie and donnie have one monkey between them.
Earnie and bonnie have two monkeys between them.
Donnie and fernie have two monkeys between them.
Who is on the immediate right of bonnie?

A. Donnie B. Earnie C. Genie D. Fernie

72 If 'blue' means 'green', 'green' means 'yellow', 'yellow' means 'orange', 'orange' means 'black', 'black' means 'white', 'white' means 'red', 'red' means 'pink', 'pink' means 'brown', 'brown' means 'grey', then what is the color of human blood?
A. Black B. Red C. White D. Orange

73 In the following question, choose the correct code form.
The number/word group in the question is to be codified according to the following letter codes:

Number	9	8	7	6	5	4	3	2	1	0
Letter	Q	U	I	C	K	L	Y	R	O	D

13311728
A. OYYOOIRU B. OYYOIROU
C. OYYORIOU D. OYYOUIRO

74 In the following question, choose the correct code form.
The number/word group in the question is to be codified according to the following letter codes (use the

ADICHUNCHANAGIRI UNIVERSITY

18MAT21

Second Semester BE Degree Examination October 2021
(CBCS Scheme)

Time: 3 Hours

Max Marks: 100 marks

Sub: Engineering Mathematics II

Q P Code: 60012

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module.
3. Your answer should be specific to the questions asked.
4. Write the same question numbers as they appear in this question paper.
5. Write Legibly

Module – 1

1 a Find the directional derivatives of $\phi = x^2yz + 4xz^2$ at $(1, -2, -1)$ along $2i - j - 2k$. — 6 marks

b If $\vec{A} = xz^3i - 2x^2yzj + 2yz^4k$ find $\nabla \times \vec{A}$ and $\nabla \cdot (\nabla \times \vec{A})$. — 7 marks

c Show that $\vec{F} = (y + z)i + (z + x)j + (x + y)k$ is irrotational. Also find a scalar function ϕ such that $\vec{F} = \nabla \phi$ — 7 marks

Or

2 a If $\vec{F} = \nabla (xy^3z^2)$ find div$\vec{F}$ and curl$\vec{F}$ at the point $(1, -1, 1)$. — 6 marks

b If $\vec{r} = xi + yj + zk$ and $r = |\vec{r}|$ prove that $\nabla (r^n) = nr^{n-2}\vec{r}$. — 7 marks

c Show that $\vec{F} = (x + y + az)i + (bx + 2y - z)j + (x + cy + 2z)k$ find a,b,c such that curl$\vec{F} = \vec{0}$. — 7 marks

Module – 2

3 a Solve : $6\frac{d^2y}{dx^2} + 17\frac{dy}{dx} + 12y = e^{-x}$. — 6 marks

b Solve : $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = e^{2x} + \cos 2x$. — 7 marks

c Solve : $(2x + 1)^2y'' - 6(2x + 1)y' + 16y = 8(2x + 1)^2$. — 7 marks

Or

4 a Solve : $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x$. — 6 marks

b Solve by the method of variation of parameters $y'' + y = \tan x$. — 7 marks

c Solve : $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = x^2\log x$. — 7 marks

Module – 3

5 a Form the partial differential equation by eliminating the arbitrary functions
$\emptyset(x + y + z, x^2 + y^2 - z^2) = 0$. — 6 marks

b Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \cdot \sin y$ for which $\frac{\partial z}{\partial y} = -2\sin y$ when $x = 0$ & $z = 0$ if y is an odd multiple of $\frac{\pi}{2}$. or $\left[z = 0 \text{ if } y = (2n + 1)\frac{\pi}{2}\right]$. — 7 marks

c Derive an expression for one dimensional heat equation. — 7 marks

PTO

Or

6 a Form the PDE by eliminating the arbitrary function : $z = e^{ax+by}f(ax - by)$. 6 marks

   b Solve : $\frac{\partial^2 z}{\partial y^2} = z$ given that when $y = 0$, $z = e^x$ & $\frac{\partial z}{\partial y} = e^{-x}$. 7 marks

   c Discuss the variable possible solution of one dimensional wave equation. 7 marks

Module – 4

7 a Discuss the convergence of $\sum_{n=1}^{\infty}(1 + \frac{1}{n})^{n^2}$ by using Cauchy's root test 6 marks

   b Test the convergence of series using D'Alembert's ratio test 7 marks
$$\frac{3}{4+1} + \frac{3^2}{4^2+1} + \frac{3^3}{4^3+1} + \frac{3^4}{4^4+1} + \cdots$$

   c Obtain the series solution of the equation $\frac{d^2y}{dx^2} + y = 0$. 7 marks

Or

8 a Discuss the convergence of $\sum_{n=1}^{\infty}\left(\frac{n+1}{n}\right)^{n^2}\frac{1}{3^n}$ by using Cauchy's root test. 6 marks

   b Prove that $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}}\sin x$. 7 marks

   c If $x^3 + 2x^2 - x + 1 = aP_0(x) + bP_1(x) + cP_2(x) + dP_3(x)$ find the values of a, b, c, d. 7 marks

Module – 5

9 a From the following table find the number of students who have obtained (a) less than 45 marks (b) between 40 and 45 marks. 6 marks

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

   b Use Lagrange's interpolation formula to find y(2). 7 marks

x	0	1	3	4
y	-12	0	6	12

   c Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's $1/3^{rd}$ rule taking four equal strips and hence deduce an approximate value of π. 7 marks

Or

10 a Fit an interpolating polynomial for the data. $u_{10} = 355, u_0 = -5, u_8 = -21, u_1 = -14,$ $u_4 = -125$ by using Newton's divided difference formula. 6 marks

   b Obtain a real root of the equation $x^3 - 2x - 5 = 0$. Correct to three decimal places. 7 marks

   c Evaluate $\int_0^6 3x^2 dx$. Divide the $[0,6]$ in to six equal parts by weddle's rule. 7 marks

*****

SUBJECT: BASIC ELECTRONIC ENGINEERING
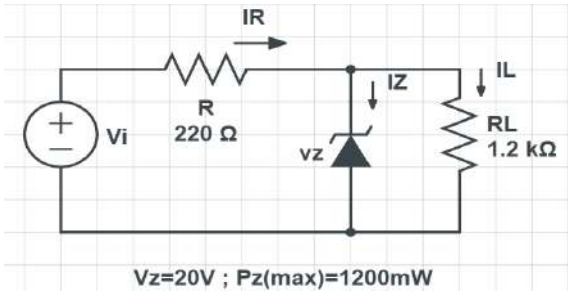
Module: 1 Digital Fundamentals.

1	Define number system? Mention its type and explain each with example.
2	Explain how to convert decimal to binary and binary to decimal with suitable examples.
3	Explain how to convert hexadecimal to decimal and decimal to hexadecimal with suitable examples.

4	Convert the following.
	    i. $(128)_{10} \rightarrow (?)_2 \rightarrow (?)_8$
	    ii. $(111001101)_2 \rightarrow (?)_{10} \rightarrow (?)_{16}$
	    iii. $(FA876)_{16} \rightarrow (?)_2 \rightarrow (?)_{10}$
	    iv. $(3E.4FC)_{16} \rightarrow (?)_{10} \rightarrow (?)_2$
	    v. $(11001.011)_2 \rightarrow (?)_{10} \rightarrow (?)_2$
	    vi. $(555.40)_{10} = (\quad)_2 = (\quad)_{16}$
	    vii. $(1110101011001)_2 = (\quad)_{16} = (\quad)_{10}$

5	Convert the Following:
	    i. $(00110111010.01011)_2 = (\ )_8 = (\ )_{10} = (\ )_{16}$
	    ii. $(FBE.DC)_{16} = (\ )_{10} = (\ )_8 = (\ )_2$
	    iii. $(510.67525)_{10} = (\ )_2 = (\ )_{16} = (\ )_8$

6	Given $M = 11010110$ and $N = 01000101$, Determine a) (M- N) b) (N-M) using Binary 2s complement method.

7	Perform the Subtraction using 1's complement method
	    i. $(11010)_2 - (10000)_2$
	    ii. $(11101)_2 - (11000)_2$
	    iii. $(1000100)_2 - (1010100)_2$

8	Subtract using 2's complement
	    i. $(111001)_2$ from $(101011)_2$
	    ii. $(42)_{10} - (68)_{10}$

9	Solve using 2's compliment subtraction:
	    i. m=11001.0110, n=10110.1010; Solve (i) m – n, (ii)n- m
	    ii. m=011101.01110,n =010111.10111; Solve (i)m–n, (ii)n-m

10	Explain all the gates with symbol and truth table.
11	Realize using only NAND gate. i. A+B ii. A.B iii. A $\oplus$ B
12	Explain full adder circuit with gates and truth table.
13	Realize the full adder using two half adder. Derive the expression for sum and carry.
14	Prove the following identities using truth table: (i) $\overline{A.B} = \overline{A} + \overline{B}$

	(ii) A. (A+B) = A
15	State and prove De-Morgan's theorem.
16	Simplify the following i) AB+ $\overline{A}$C+ A$\overline{B}$C (AB+C) ii) (A+$\overline{B}$) (CD+E).
17	Discuss half adder with circuit diagram and truth table.
	For the expression Y= $\overline{A}$ B + A $\overline{B}$ i) Obtain the truth table ii) Realise the logic using AND, OR, NOT gates iii) Realise the logic using NAND gates only
18	Simplify the following Boolean expressions and draw the logic diagram using NOT, AND, OR gates for simplified expression and write the truth table. i) Y= $\overline{A}\,\overline{B}\,\overline{C}\,\overline{D}$ + $\overline{A}\,\overline{B}\,\overline{C}\,D$ + $A\,\overline{B}\,\overline{C}\,\overline{D}$ + $A\overline{B}\,\overline{C}\,D$ ii) Y= $\overline{\overline{A} + B} + \overline{CD}$

Module 2: Semiconductor Diode and its application

1	Define PN junction diode. Explain the construction of PN junction diode.
2	Explain the characteristic curve of PN junction diode.
3	Explain the operation of PN junction diode under for forward and reverse biased condition.
4	Define rectifier. Sketch a half wave rectifier with wave forms and derive the following i. Average voltage ii. Average current iii. Efficiency iv. Ripple factors
5	Explain the operation of half wave rectifier with neat circuit diagram and wave form.
6	Show that the ripple factor of a half wave rectifier is 1.12 and efficiency is 40.5%.
7	In an HWR, the 2° voltage of transformer is 80V, if the value of load resistance is 20Ω. Calculate a) DC voltage b) PIV c) DC current d) Power delivered to the load e) Rectification efficiency.
8	Explain the operation of full wave rectifier with capacitor filter with neat circuit diagram and wave form.
9	Illustrate the operation of a full wave rectifier circuit with center tap transformer. Sketch the input and output waveforms.
10	Explain with neat circuit diagram and waveform the working of center tap full wave rectifier. Show that efficiency of full wave rectifier is 81%.(R)
11	Derive the following for full wave rectifier.

	i. Average voltage ii. Average current iii. Efficiency iv. Ripple factors
12	Explain the operation of full wave rectifier with capacitor filter with neat circuit diagram and wave form.
13	In an HWR, the 2° voltage of transformer is 80V, if the value of load resistance is 20Ω. Calculate a) DC voltage b) PIV c) DC current d) Power delivered to the load e) Rectification efficiency.
14	Explain how zener diode helps in voltage regulation with neat circuit diagram.
15	What is zener diode? With neat circuit diagram explain the operation of voltage regulator.
16	Determine the range of Vi in which the Zener diode of below figure conducts Vz=20V ; Pz(max)=1200mW
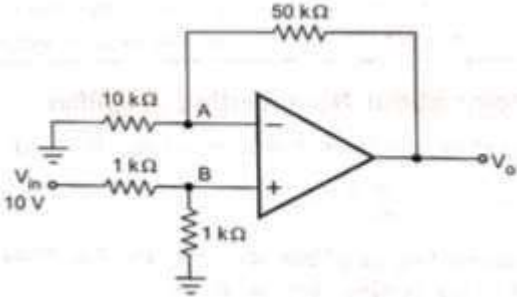
Module 3: Transistors and its applications

1	Define transistor. Explain the structure of transistor with symbol
2	Describe in detail the working principle of a PNP bipolar junction transistor.
3	Describe in detail the working principle of a NPN bipolar junction transistor. Why is it called Bipolar?
4	Draw and explain the input and output characteristics of n-p-n silicon transistor in CE configuration. Indicate cut off, saturation and active regions.
5	Describe DC Load line and Operating point of a transistor with neat sketch.
6	With neat circuit diagram, explain in detail transistor as amplifier and switch.
7	Explain the Construction of p-Channel JFET with neat diagram.
8	Explain the Construction of p-Channel JFET with neat diagram.
9	Explain the drain characteristics curve and transfer characteristic curve of an n-channel JFET.

10	Explain the drain characteristics curve and transfer characteristic curve of an p-channel JFET
11	Explain the construction of n-channel depletion type MOSFET with neat diagram.
12	Explain the construction of p-channel depletion type MOSFET with neat diagram.
13	Explain the operation of n-channel depletion type MOSFET with drain characteristics curve and transfer characteristic curve.
14	Explain the operation of p-channel depletion type MOSFET with drain characteristics curve and transfer characteristic curve
15	Explain the construction of n-channel enhancement type MOSFET with neat diagram.
16	Explain the construction of p-channel enhancement type MOSFET with neat diagram.
17	Explain the operation of n-channel enhancement type MOSFET with drain characteristics curve and transfer characteristic curve.
18	Explain the operation of p-channel enhancement type MOSFET with drain characteristics curve and transfer characteristic curve.
19	List the difference between Depletion-MOSFET and Enhancement-MOSFET.
20	Explain the construction and operation of SCR with neat circuit diagram and VI characteristics.
21	Explain the two transistor model of SCR.
22	Explain the switching action of SCR.

Module 4: Operational Amplifier and Oscillators.

1	List the characteristics of ideal Op-Amp.
2	List the ideal characteristics of Operational Amplifier and explain any two.
3	Define the following term with respect to op-amp. i. CMRR ii. Slewrate iii. PSRR iv. Offset voltage
4	Explain the block diagram of Operation Amplifier.
5	Explain the concepts of virtual ground of op-amp with neat circuit diagram.
6	Derive the expression for output voltage and gain for inverting Amplifier with neat circuit diagram.

7	Derive the expression for output voltage and gain for non-inverting Amplifier with neat circuit diagram.
8	Explain voltage follower with neat circuit expression and waveform.
9	Explain the Application of Op-Amp as an Integrator & Voltage follower.
10	Explain the Inverting summing Amplifier and Derive the equation for output voltage and gain.
11	Explain the non-inverting summing Amplifier and Derive the equation for output voltage and gain.
12	Explain the Application of Op-Amp as a Differentiator with suitable equations.
13	Explain the Application of Op-Amp as a integrator with suitable equations.
14	Explain op-amp as a subtractor with neat circuit diagram.
15	Find the Vo for the circuit given
16	Find the output voltage and gain for inverting amplifier if Vin=10V, R_f=57KΩ and R1=10KΩ.
17	Explain RC phase shift oscillator with circuit diagram and necessary equations.
18	State and explain the Barkhausen's criteria for oscillator.
19	With a neat circuit diagram explain the working of Wein bridge oscillator.
20	Define an oscillator. Derive the equation for Wein bridge oscillator

Module 5: Communication System

1	With neat block Diagram explain the basic communication system.
2	Define Amplitude modulation with waveform and expression.
3	Explain the need for modulation
4	Define modulation index for AM. Sketch AM wave for m>1 and m=1.
5	Derive the modulation index of AM in terms of V_{max} and V_{min} with neat waveform.
6	Define Frequency modulation with waveform and expression.
7	What are the difference between AM and FM
8	Explain principle of operation of Mobile communication.
9	With neat block diagram explain cellular transmitter system.
10	With neat block diagram explain cellular transmitter system.
11	With neat block diagram explain microwave communication system
12	With neat block diagram explain the fiber optic communication system.

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Working:-

* The field winding is on the stator & the armature winding is on the rotor.

* The DC current from the DC supply flows through the carbon brushes, Commutator segments & armature conductors placed on periphery of rotor.

* The current in these armature conductor of rotor produces their own magnetic field which interacts with the magnetic field of field windings & hence Experience a mechanical force.

* These twisting and tangential forces constitute a "Torque" which rotates the rotor.

* Torque :- The twisting force that makes the object to rotate.

Back Emf:-

* In the DC motor due to motoring action the armature starts rotating & the armature conductors cut the main flux of field winding hence according to faradays law, an Emf is induced in the opposite direction to the supply voltage according to lenz's law.

* Thus like a DC generator, dc motor too has induced Emf in the armature with the same Eqn.

$$E_b = \frac{\phi P N Z}{60 A} \; ; \text{volts}$$

∴ Back emf in a DC motor
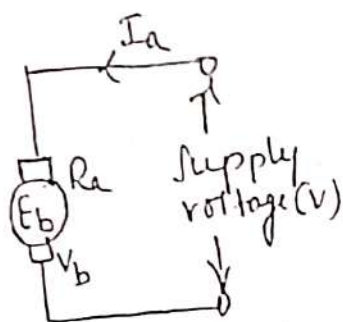
∴ the supply voltage 'V' for the DC motor is given by

$$V = I_a R_a + E_b + V_b \; ; \; volts$$

* Brush drop is practically neglected

$$I_a R_a = V - E_b$$

$$I_a = \frac{V - E_b}{R_a} \; ; \; A$$

Significance of Back emf :-

* The presence of back emf of the DC motor acts as a **regulating machine**.
i.e., motor adjusts itself to draw the armature current first enough to satisfy the Load demand.

* For a given machine A, Z, P are fixed (constant)
i.e.,

$$E_b = \frac{\phi P N Z}{60 A}$$

But

$$K = \frac{Z P}{60 A} \; .$$

$$E_b = \phi N K \; ; \; volts.$$

$$\langle E_b \propto N \rangle$$

i.e., back emf is directly proportional to speed.

*(i) When load is suddenly applied to the motor, it tries to slow down, so speed of the motor reduces, hence back emf also decreases.
∴ Net voltage across armature (V-E_b) increases & ∴ motor draws more armature current.

Due to increase in armature current, force ③
Experienced by the conductors & the torque on
the armature increases.

*(ii) When the load on motor is decreased, speed
of the motor increases & hence back emf increases,
this deduces armature current & the torque.

* Hence back emf deregulates the flow of armature
current & automatically alters the current I_a and
torque to changes in the load. This is the practical
significance of back emf.
* At the starting of motor the speed is zero and
hence back emf is zero).

Torque Equation of DC motor :-

W.K.T the voltage Equation of a D.C. motor is

$$V = E_b + I_a R_a \longrightarrow ①$$

Multiply by I_a on B·S to get power $\underline{Eqn}$

$$V I_a = E_b I_a + I_a^2 R_a \longrightarrow ②$$

where,

$V I_a$ = Total Electrical power supplied to the
armature.

$I_a^2 R_a$ = represents the loss due to armature resistance.

$E_b I_a$ = represents the Electrical power that is converts
to mechanical power by the armature

$$\therefore \langle P_m = E_b I_a \rangle \longrightarrow ③$$

* W.K.T the twisting force about an axis is call

    Torque.

$\therefore$ consider a wheel of radius 'a' acted upon by a circumferential force 'F' newtons as shown below.
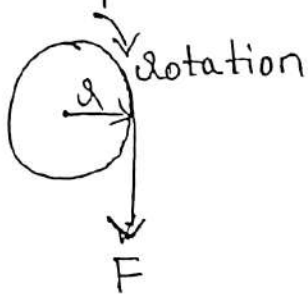
$\therefore$ The angular speed is given by

$$w = \frac{2\pi N}{60} \quad rad/sec \longrightarrow ④$$

Workdone in one revolution is

$$w = Force \times distance \ travelled.$$

$$w = F \times 2\pi a \longrightarrow ⑤$$

$\therefore$ Mechanical power developed $= \dfrac{Workdone}{time}$

$$= \frac{F \ 2\pi a}{60/N}$$

$$P_m = (E \times a) \frac{2\pi N}{60} \longrightarrow ⑥$$

$$P_m = T_a \cdot \frac{2\pi N}{60} \quad ; watts \longrightarrow ⑦$$

where T_a is the torque in newton meters Excerted in the armature to develop the mechanical power

$\therefore$ Equate Eqn ⑤ and ⑦

$$E_b I_a = T_a \cdot \frac{2\pi N}{60} \longrightarrow ⑧$$

w.K.T $\quad E_b = \dfrac{\phi N Z P}{60 A} \longrightarrow$ substitute in ⑧

$$\frac{\phi \cancel{N} Z P}{\cancel{60} A} \cdot I_a = T_a \frac{2\pi \cancel{N}}{\cancel{60}}$$

$$\therefore \left\langle \tau_a = \frac{\phi Z P}{2 \pi A} \cdot I_a \right\rangle Nm$$

$$\left\langle \tau_a = 0.159 \, \phi Z \, I_a \frac{P}{A} \right\rangle ; Nm$$

\# For a given machine Z, P, A are fixed

$$\therefore \left\langle \tau_a \propto \phi I_a \right\rangle$$

i.e., Torque developed is proportional to the product of armature current 'I_a' & flux per pole.

Note:- All the torque developed by the armature is not available at the shaft, due to friction loss at bearing & brushes.

$\therefore$ The torque at the shaft is

$$\left\langle \tau_{sh} = \tau_a - \tau_L \right\rangle$$

$\tau_{sh} \rightarrow$ torque at shaft

$\tau_a \rightarrow$ Armature shaft

$\tau_L \rightarrow$ Torque Lost

Types of DC motors :-

Depending on the way in which the field windings are connected to the armature, D.C. motors are classified into 3 types.

① DC shunt motor

② DC series motor

③ DC compound motor

① DC shunt motor :-

I_L

I_{sh} I_a

R_{sh} E_b R_a V_b
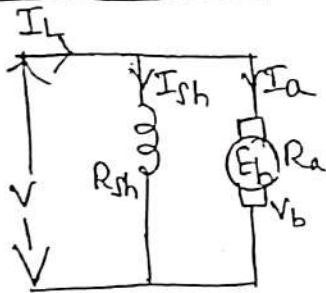
$\langle * \rangle$ $I_L = I_{sh} + I_a$

$I_a = I_L - I_{sh}$

where $I_{sh} = \dfrac{V}{R_{sh}}$

$\langle * \rangle$ $V = I_a R_a + E_b + V_b$

neglect V_b

$V = I_a R_a + E_b$

$E_b = V - I_a R_a$

② DC series motor :-

I_L R_{se}

I_{se} I_a

E_b R_a V_b
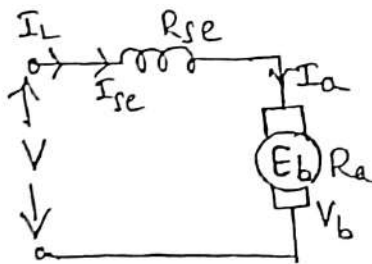
$\langle * \rangle I_L = I_{se} = I_a$

$\langle * \rangle V = I_{se} R_{se} + R_a I_a + E_b + V_b$

neglect V_b

$V = I_a R_{se} + I_a R_a + E_b$

$E_b = V - I_a [R_{se} + R_a]$

AC Compound motor :-

a] Long shunt AC motor
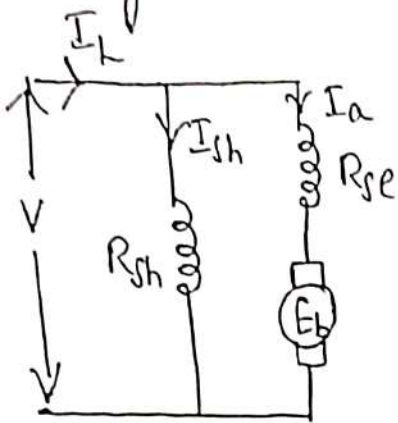
⟨*⟩ $I_L = I_{sh} + I_a$

$I_a = I_L - I_{sh}$

where $I_{sh} = \dfrac{V}{R_{sh}}$

⟨*⟩ $V = I_a R_{se} + E_b + I_a R_a + V_b$

neglect V_b

$V = I_a R_{se} + E_b + I_a R_a$.

$E_b = V - I_a (R_{se} + R_a)$

b] Short shunt AC motor
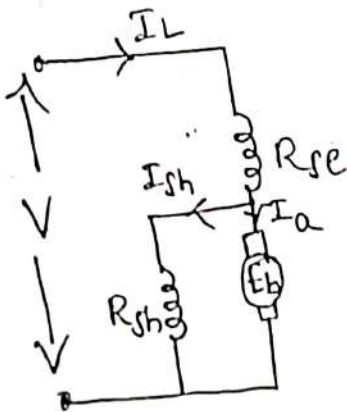
⟨*⟩ $I_L = I_a + I_{sh}$

$I_a = I_L - I_{sh}$

where $I_{sh} = \dfrac{V - I_L R_{se}}{R_{sh}}$

⟨*⟩ $V = I_L R_{se} + I_a R_a + E_b + V_b$

neglect V_b .

$E_b = V - I_L R_{se} - I_a R_a$.

Characteristics of DC motor :-

* There are 3 important characteristics of DC motors.
* These characters are studied keeping the applied voltage 'V' constant.

They are

1) Electrical characteristic (or) T_a/I_a characteristic
2) Speed to current (or) N/I_a characteristic
3) Mechanical (or) N/T_a characteristic.

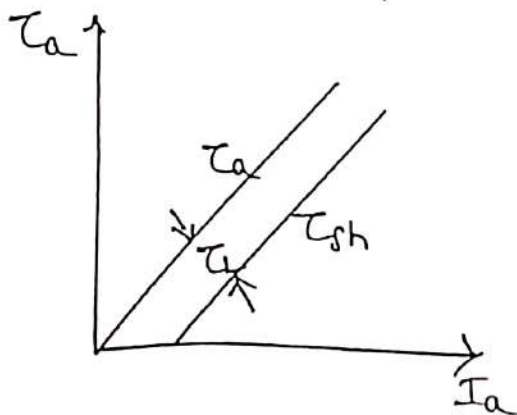## characteristics of DC shunt motors :-

a) T_a/I_a Characteristic

since the applied vtg 'V' remains constant, the field current I_{sh} remains constant irrespective of the load. Hence flux produced also remains constant.
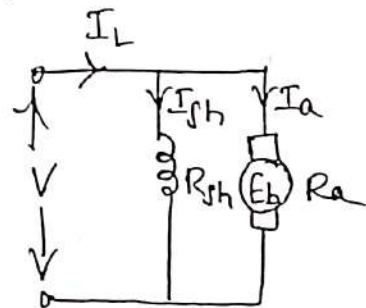
$$T_a = 0.159 \phi Z I_a \left(\frac{P}{A}\right)$$

i.e., in this eqn. Z, P, A & ϕ are constants
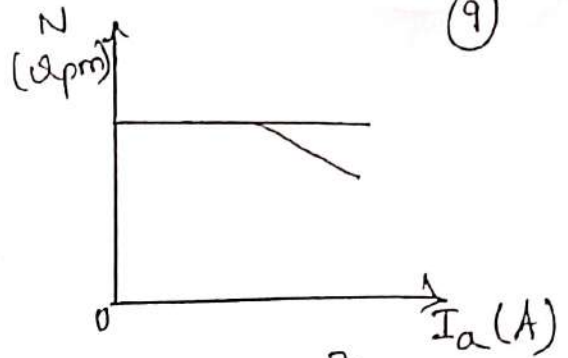
$$\therefore \langle T_a \propto I_a \rangle$$

since the shaft torque is always less than armature torque. Due to Losses [iron & friction] it is less than T_a as shown in fig.

N/Ia characteristic

W.K.T $E_b = \dfrac{\phi Z N p}{60 A}$

Since A, Z, ϕ, p are constant

$\therefore \boxed{N \propto E_b \propto V - I_a R_a}$ $\left[\because E_b = V - I_a R_a\right]$

i.e., as $I_a R_a$ increases the speed decreases, But $I_a R_a$ drop is very small compared to V.

$\therefore$ the decrease in speed as current increases is also small ⓞⓡ negligible.
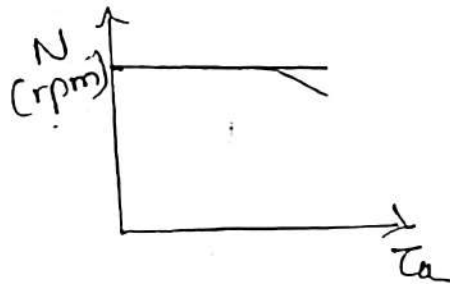
$\therefore$ The speed almost remains constant.

c) **N/Ta Characteristic**

W.K.T $T_a = 0.159 \, \phi Z I_a \left(\dfrac{P}{A}\right)$

From above Eqn.

$\qquad T_a \propto I_a$

& also speed (N) depends on I_a.

$\therefore$ N/Ia characteristic is similar N/Ta characteristics as shown
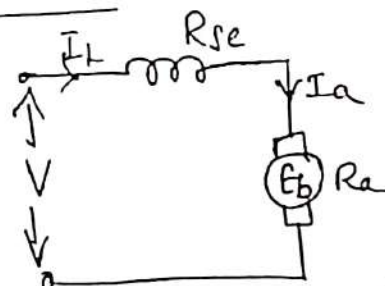
characteristics of DC series motor

a) **Ta/Ia characteristic**

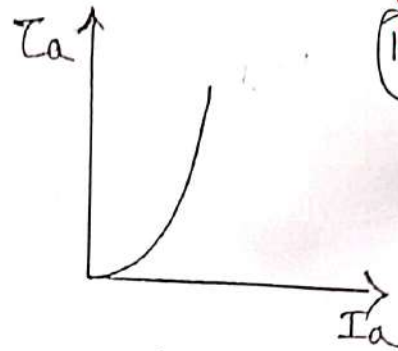W.K.T $T_a = 0.159 \, \phi Z I_a \left(\dfrac{P}{A}\right)$

* For series motor, as load increases the current through the series field winding also increases, hence flux produced also increases.

$$\therefore T_a \propto \phi I_a$$

But $\phi \propto I_a$

$$\therefore \boxed{T_a \propto I_a^2}$$

Hence the variation of T_a w.r.t I_a is as shown.

b) **N/I_a characteristic**

w.k.T $\quad E_b = \dfrac{\phi Z N P}{60 A}$

$$\therefore \quad N \propto \dfrac{E_b}{\phi} \propto \dfrac{V - I(R_a + R_{se})}{\phi}$$
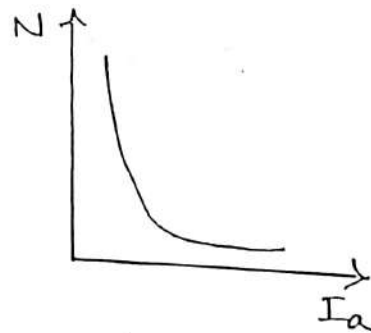
i.e., as the load on the motor increases,

a) $I_a (R_a + R_{se})$ increases & hence speed decreases.

b) flux ϕ also increases due to which the speed

decreases.

Where the first factor is negligible as the $I_a R$ drop
is very less.

$\therefore$ According to second factor
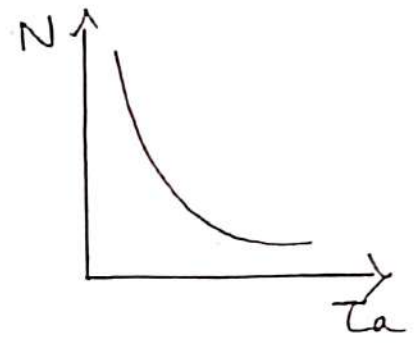
$$\left\langle \begin{array}{c} N \propto \dfrac{1}{\phi} \\[4pt] \& \quad \phi \propto I_a \\[4pt] \therefore N \propto \dfrac{1}{I_a} \end{array} \right\rangle$$

i.e., speed is inversely proportional to flux and
current I_a.

N/T_a characteristics

Since $T_a \propto I_a^2$

$\therefore I_a \propto \sqrt{T_a}$

$\therefore \left\langle N \propto \dfrac{1}{\sqrt{T_a}} \right\rangle$ from N/I_a characteristic

Problems :-

① A 4 pole DC shunt motor takes 22A from 220V supply. The armature & field resistance are respectively 0.5Ω and 100Ω respectively. The armature is lap connected with 300 conductors. If the flux per pole is 20 mwb. Calculate the speed and gross torque.

Sol

$p = 4$

$I_L = 22A$

$V = 220V$

$R_a = 0.5Ω$

$R_{sh} = 100Ω$

$Z = 300$

$\phi = 20 m wb$

a) $N = ?$

b) $T_a = ?$

For Lap

$A = p = 4$

a) w.k.T

$E_b = \dfrac{\phi P N Z}{60 A}$

$N = \dfrac{E_b \cdot 60 \cdot A}{\phi P Z}$

$\therefore N = \dfrac{210.1 \times 60 \times 4}{20 \times 10^{-3} \times 4 \times 300}$

$\langle N = 2101 \text{ rpm} \rangle$

b) $T_a = 0.159 \phi I_a Z \left(\dfrac{P}{A}\right)$

$= 0.159 \times 20 \times 10^{-3} \times 19.8 \times 300 \times \dfrac{4}{4}$

$\langle T_a = 18.89 \text{ Nm} \rangle$
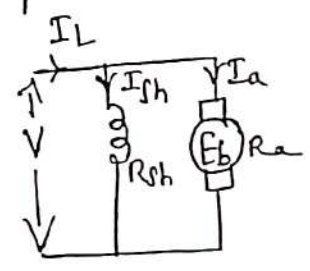
$E_b = V - I_a R_a$

$E_b = 220 - (19.8)(0.5)$

$E_b = 210.1 V$

$I_a = I_L - I_{sh}$

$I_a = 22 - 2.2 = 19.8A$

$I_{sh} = \dfrac{V}{R_{sh}} = \dfrac{220}{100}$

$I_{sh} = 2.2 A$

2) A DC shunt motor takes an armature current of 11[0] at 480V. The armature resistance is 0.2Ω. The machi[ne] has 6 poles & armature is Lap connected with 864 conductors. The flux per pole is 0.05 wb. Calculate (i) Speed (ii) Torque developed by the armature.

Sol

$I_a = 110 A$
$V = 480V$
$R_a = 0.2Ω$
$P = 6$
$Z = 864$
$\phi = 0.05 wb$
$N = ?$
$T_a = ?$

for Lap
$A = P = 6$

(i) $E_b = \dfrac{\phi P N Z}{60 A}$

$N = \dfrac{E_b \, 60 \, A}{\phi P Z}$

$\left\langle N = \dfrac{458 \times 60 \times 6}{0.05 \times 6 \times 864} = 636 \cdot 5 pm \right\rangle$

$E_b = V - I_a R_a$
$= 480 - (110 \times 0.2)$

$\langle E_b = 458 V \rangle$

(ii) $T_a = 0.159 \, \phi \, I_a Z \left(\dfrac{P}{A}\right)$

$= 0.159 \times 0.05 \times 110 \times 864 \left(\dfrac{6}{6}\right)$

$\langle T_a = 755.57 \, Nm \rangle$

---

3) A 500V shunt motor has 4 poles and a wave connected winding with 492 conductors. The flux per pole is 0.05 wb, the full load current is 20 Amps. The armature & shunt field resistances 0.1Ω & 250Ω respectively. Calculate the speed & the developed torque.

Sol

$V = 500V$
$P = 4$
$Z = 492$
$\phi = 0.05 wb$
$I_L = 20 A$

$R_a = 0.1Ω$
$R_{sh} = 250Ω$
$N = ?$
$T_a = ?$
$A = 2 (wave)$

$E_b = \dfrac{\phi P N Z}{60 A}$

$\langle N = 608 \; rpm \rangle$

$T_a = 0.159 \, \phi \, I_a Z \left(\dfrac{P}{A}\right)$

$\langle T_a = 140.81 \, Nm \rangle$

$E_b = V - I_a R_a$
$E_b = 498.2 V$
$I_a = I_L - I_{sh}$
$I_a = 18 A$
$I_{sh} = \dfrac{V}{R_{sh}} = 2 A$

200V, 4 pole, Lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5Ω & that of the shunt field winding is 200Ω. The motor takes 21A and flux per pole is 30mwb. Find speed & gross torque developed in the motor.

Sol:

$V = 200V$

$P = 4$

$Z = 800$

$R_a = 0.5Ω$

$R_{sh} = 200Ω$

$I_L = 21A$

$\phi = 30\,m\,wb$

$N = ?$

$T_a = ?$

$A = P \,(Lap)$

$E_b = \dfrac{\phi PNZ}{60A}$

$N = \dfrac{E_b \times 60 \times A}{\phi P Z}$

$\langle N = 475\,rpm \rangle$

$T_a = 0.159\,\phi I_a Z\left(\dfrac{P}{A}\right)$

$\langle T_a = 76.32\,Nm \rangle$

$E_b = V - I_a R_a$

$E_b = 190V$

$I_a = I_L - I_{sh}$

$I_a = 20A$

$I_{sh} = \dfrac{V}{R_{sh}} = 1A$

---

5) A 4 pole DC shunt motor takes 22.5A from a 250V supply. The armature resistance is 0.5Ω & shunt field resistance is 125Ω. The armature is wave wound with 300 conductors. If the flux/pole is 0.02wbs. Calculate (i) Speed (ii) Torque developed and (iii) power developed.

Sol:

$P = 4$

$I_L = 22.5A$

$V = 250V$

$R_a = 0.5Ω$

$R_{sh} = 125Ω$

$Z = 300$

$\phi = 0.02\,wb$

$N = ?$

$T_a = ?$

$P_m = ?$

$A = 2\,(wave\,wound)$

$N = \dfrac{E_b \times 60 \times A}{\phi P Z}$

$\langle N = 1199\,rpm \rangle$

$T_a = 0.159\,\phi I_a Z\left(\dfrac{P}{A}\right)$

$\langle T_a = 39.114\,Nm \rangle$

$\langle P_m = E_b \times I_a = 4.914\,kW \rangle$

$E_b = V - I_a R_a$

$E_b = 239.75\,V$

$I_a = I_L - I_{sh}$

$I_a = 20.5A$

$I_{sh} = \dfrac{V}{R_{sh}} = 2A$

MODULE - 4

Unit 1 - DC Generator ⎫
Unit 2 - DC Motor   ⎬ DC machines.
                       ⎭

DC generator is a device which converts mechanical energy into electrical Energy.

Prof thwetha.Y
Dept of ECE
BGSIT B.G. Nagar.

Construction of a D.C. machine.

Field winding →
F₁ x Excitation
Yoke
Flux produced
Armature tooth
pole core
Armature winding
pole shoe
→ shaft
Armature core
Brush
Commutator
Armature slot
Base
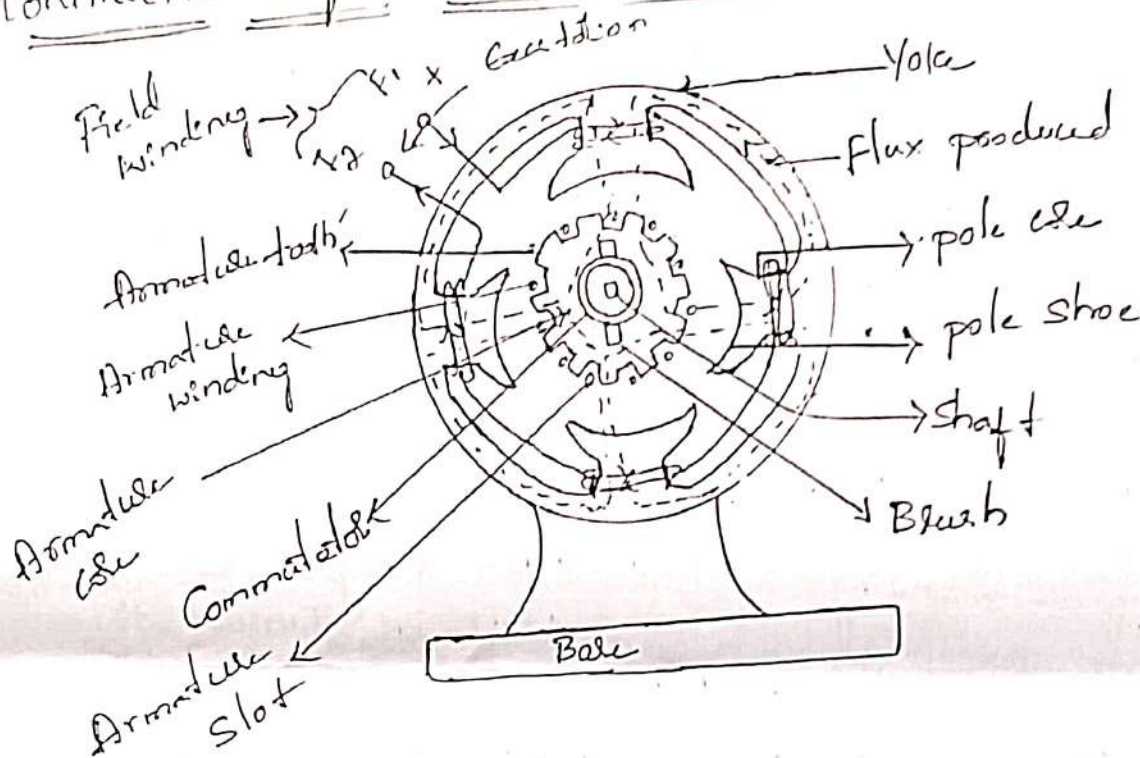
* Whether a machine is d.c. generator (or) a motor the construction basically remains the same as shown in the figure above.

* It consists of the following parts & their functions are :-

(a) yoke :- It is the outermost cover of the D.C. machine so that the inner materials get protected from harmful atmospheric Elements like moisture, dust Etc.,

    * It is made up of cast iron for small machines and of silicon steel for large machines.

(i) It acts as a protective cover for the whole machine

(ii) It also provide a path for the magnetic flux.

ⓑ poles :- Each pole has two parts i.e.,
       (i) pole core & (ii) pole shoe.

* pole core carries a field winding which is
necessary to produce the flux
& it directs the flux produced
through airgap to armature core.

← yoke
← core
← shoe
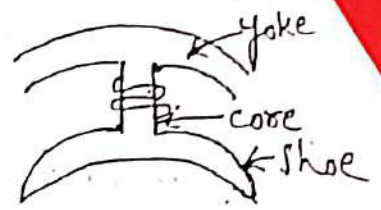
* pole shoe enlarges the area of armature core to
link with flux, so that larger induced emf is
achieved.

* the poles are made up of cast iron ⓞⓡ cast
steel with laminations.

ⓒ Field winding $(F_1 - F_2)$

* The field windings are wound on the pole core with
definite direction, when current flows through these
field windings, it behaves as an electromagnet, thus
producing the flux.

* The field winding is made up of aluminium ⓞⓡ
copper

* These field winding is divided into coils called
field coils,

ⓓ Armature :- The armature has two parts namely
      ① Armature core   ② Armature windings

* Armature core :- It is cylindrical in shape
mounted on the shaft. It consists of slots on
the outer periphery to accomodate armature
conductor & the airducts to permit the air flow
through armature which serves cooling purpose.

* The core is made up of lamination to reduce
         eddy current loss.

rmature windings :- These windings are nothing but the armature conductor placed in the slots of the armature core.

* When the armature is rotated, the magnetic flux get cut by armature conductor & emf gets induced in them in case of generator.

* In case of D.C. motor, It carries current i.e., supplied by the source.

* The windings are made up of good conductor i.e., copper.

) Commutator -

* The basic nature of emf induced in the armature conductor is, alternating which need rectification for the case of D.C. generator, this is achieved by using a device called Commutator.

* It converts developed alternating emf to unidirection -al emf (dc emf)

* The material used is copper.

) Brushes (or) Brush gear :-

* It is placed on the surface of commutator.
* It collects current from commutator and makes it available to the stationary external circuit.
* It is made up of soft material like carbon.

) Bearings :- For smooth rotation the bearings are used. For heavy duty machines, roller bearings are preferred.

Working principle of a D.C. machine as generator.

All generator works on the principle of dynamically induced emf.

i.e., an emf is induced (developed) in a conductor as long as there exists a relative motion b/w conductor & the flux.

The no of conductors are connected together in a specific manner, to form a winding called as armature winding of a dc machine.

- The conductors placed on the armature are rotated with the help of some external device called as prime movers.

* The magnetic flux is produced by current carrying windings which are called as field windings.

* These flux links with the rotating conductor & due to change in flux an emf is induced. A/c to the principle of dynamically induced emf

$$e = BLv \sin\theta \text{ volts}.$$

* According to above eqn, the nature of induced emf is purely sinusoidal i.e., alternating in nature

* To have D.C. voltage a device called commutator is used to convert the alternating emf to unidirectional emf.

Types of Armature winding:-

W.K.T the armature conductors are connected in a specific manner to give armature windings.

* This armature windings are of two types, they are

① Lap windings   ② Wave windings.

Lap windings.

① The connections overlap Each other as the winding proceeds.
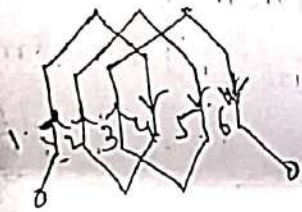
② Number of parallel paths
$(A) = poles (p)$
i.e., $A = p$

③ No of brush set required is Equal to no of poles.

④ preferable for high current, Low voltage capacity generators i.e., more than 500A.

⑤ If $Z = $ total no. of conductors then
$\dfrac{Z}{A=P}$ is the no of cond. in each path

Wave windings.

① the winding travels ahead avoiding the overlapping in a progressive fashion.
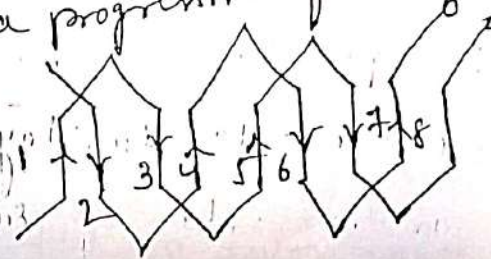
② Number of parallel paths,
$A = 2$ always.

③ No. of brush sets required is always Equal to two.

④ preferable for high voltage, low current capacity generators i.e., less than 500A.

⑤ If $Z = $ total no. of conductors then.
$\dfrac{Z}{2}$ is the no of conductors in each path.

```
┌─────────────────┐
│  Z/p conductors │           Ia/p
│  in series      │──────→
└─────────────────┘
Ia/p
┌─────────────────┐    Ia/p
│  Z/p conductors │──────→
│  in series      │
└─────────────────┘
      :
Ia/p  ┌─────────────────┐   Ia/p
↑Ia──→│  Z/p conductors │──────→
      │  in series      │
      └─────────────────┘
                              ↓Ia
```

```
┌─────────────────┐   Ia/2
│  Z/2 conductors │──────→
│  in series      │
└─────────────────┘
Ia/2
┌─────────────────┐
│  Z/2 conductors │
│  in series .    │  Ia/2  Ia
└─────────────────┘   ↓
↑Ia
```

Total A = p   Total A = 2

<u>No of ||^{lel} paths</u>   <u>No of parallel paths.</u>

{ Let φ be the flux/pole in wbs
Z = Total no. of Condler
P = No of poles
A = No of parallel paths, N is the speed of
armature, Eg = EMF generated in any one
parallel path.
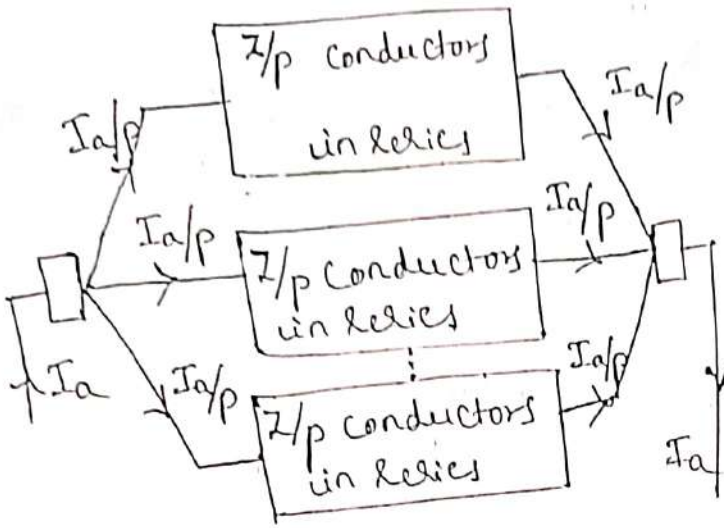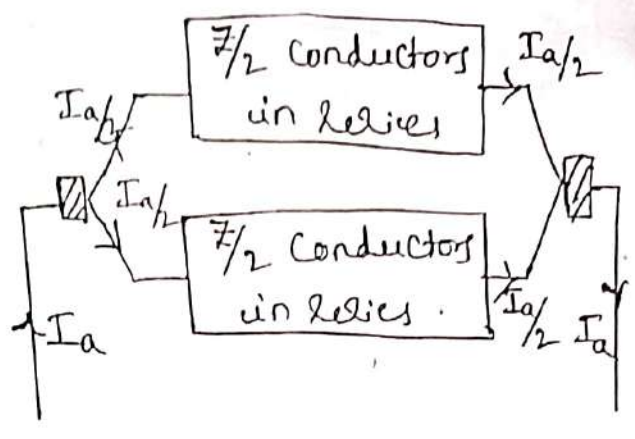
<u>EMF Equation of DC generator)</u>

* According to Faladays law of Electromagnetic induction,
the average value of Emf induced in Each conductor
is given by

emf / conductor $E_g = \dfrac{d\phi}{dt}$ ⟶ ①

* In one revolution, the conductor will cut total flux,
produced by all the poles,
i.e., $d\phi = \phi \times p = \phi p$ ⟶ ②

* The time required to complete one revolution is
$$dt = \dfrac{60}{N}$$ ⟶ ③   (N = speed in rpm).

substitute ② & ③ in ①

∴ $E_g = \dfrac{\phi P}{\frac{60}{N}} = \dfrac{\phi PN}{60}$ ⟶ ④

* If there are $\dfrac{Z}{A}$ conductor/parallel path, the induced
Emf across all the parallel path is given by

∴ EMF generated in any one parallel path = EMF gen/Conductor × no. of Cond/path

$$(1)$$

$$E_g = \frac{\phi PN}{60} \times \frac{Z}{A} \quad \text{Volts} \quad (5)$$

∴ Total emf equation of a dc generator is

$$E = \frac{\phi PNZ}{60A}$$

with A = P for Lap windings

A = 2 for wave windings.

problem :-

① A 4 pole, 1500 rpm dc generator has a lap wound armature having 24 slots with 10 conductor/slot. If the flux per pole is 0.04 wb, calculate the emf generated in the armature. What would be the generated emf, if the winding is wave connected?

Sol

P = 4
N = 1500 rpm
Lap ; A = P = 4
φ = 0.04 wb

Z = slots × conductor/slot
Z = 24 × 10
Z = 240

For Lap

$$E = \frac{\phi PNZ}{60A} = \frac{(0.04)(4)(1500)(240)}{60 \times 4}$$

$$= 240V$$

For wave
A = 2

$$E = \frac{\phi PNZ}{60A} = \frac{0.04(4)(1500)(240)}{60 \times 2}$$

$$= 480V$$

⑧

(5) A 4 pole generator with wave wound armature has 51 slots each having 24 Conductors. The flux per pole is 0.01 wb. At what speed must the armature rotate to give an induced Emf of 220V? What will be the voltage developed if the winding is Lap and the armature rotates at the same speed.

Sol.

$p = 4$

$\phi = 0.01 wb.$

$E = 220V$

$N = ?$; wave.

$E = ?$; Lap

For wave ; A=2
For Lap ; A=p

$Z = 51 \times 24$

$= 1224$

For wave :-

$$E = \frac{\phi p N Z}{60 A} = \frac{(0.01)(4) N \times 1224}{60(2)}$$

$$220 = \frac{N}{120}$$

$N = 539.2156$ rpm.

For Lap :-

$$E = \frac{\phi p N Z}{60 \times p} \quad ; \quad N = 539.2156$$

$$A = p = 4$$

$$\langle E = 110V \rangle$$

③ An 8-pole, Lap-connected armature has 40 slots with 12 conductors per slot, generates a voltage of 500V. Determine the speed at which it is running. If the flux per pole is 50m wb.

Sol.

$p = 8$ $\phi = 50 m wb$

Lap ; A=p

$Z = 40 \times 12$

$Z = 480$

$E = 500V$

$N = ?$

$$E = \frac{\phi p N Z}{60 \times p}$$

$$500 = \frac{(50 \times 10^{-3})(8) N \times 480}{60 \times 8}$$

$$\langle N = 1250 rpm \rangle$$

First Semester BE Examination July 2021

(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: Basic Electrical Engineering

Q P Code: 60004/60014

Instructions: 1**.** Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked**.**
4. write the same question numbers as they appear in this question paper**.**
5. Write Legibly

Module – 1

1	a	State and explain Ohm's law and mention its limitations.	6 marks
	b	Derive an expression for the equivalent resistance of three resistors which are connected in series and also explain the characteristics of series circuits.	8 marks
	c	A 8 ohm resistor is in series with a parallel combination of two resistors 12 ohm and 6 ohm. If the current in the 6 ohm resistor is 5A.determine the total power dissipated in the circuit.	6 marks

OR

2	a	State and explain the Kirchhoff's laws with an example	7 marks
	b	Define RMS value of alternating current, show that its value is proportional to maximum value.	7 marks
	c	Define the following with respect to sinusoidal alternating quantity: (i) Average Value, (ii) Form factor and, (iii) peak factor	6 marks

Module – 2

3	a	Show that in a pure inductor the current lag behind the voltage by 90°. Also draw the voltage and current waveforms.	6 marks
	b	A 230 V, 50 Hz ac supply is applied to a coil of 0.06H inductance and 2.5Ω resistance connected in series with a 6.8μF capacitor. Calculate (i) Impedance (ii) Current (iii) Phase angle between current and voltage (iv) power factor (v) power consumed	7 marks
	c	Obtain the relationship between line and phase voltages and currents in three phase balanced delta connected system	7 marks

Or

4	a	List out the advantages of three phase system as compared to single phase system	6 marks
	b	Show that two wattmeter's measure three phase power with suitable circuit diagram and vector diagrams.	8 marks
	c	A coil of resistance 10, and inductance 1.013 H, is connected in series with a 10 μ F capacitor. Calculate (a) the resonant frequency, (b) the circuit current, when connected to a 240 V, 50 Hz supply, and (c) the P.D. developed across the capacitor	6 marks

Module – 3

5	a	Explain the working principle of transformer.	6 marks

PTO

	b	List different types of loss in transformer and explain each one in brief.	8 marks
	c	A 250KVA, 11000/415V,50Hz single phase transformer has 80 turns on secondary. Calculate. (i)The rated primary and secondary currents (ii)The number of primary turns (iii)The maximum value of flux (iv)Voltage induced per turn	6 marks

Or

6	a	What is earthing? Why earthing is required? With the help of sketch Explain plate earthing.	8 marks
	b	With a neat sketch and truth table explain 2 way and 3 way control of lamp.	8 marks
	c	What are the Precautions against electric shock?	4 marks

Module – 4

7	a	Explain the working principle of D.C motor with suitable diagrams.	6 marks
	b	Derive an EMF equation for D.C generator with usual notations	6 marks
	c	A shunt generator delivers 195A at terminal voltage of 250V. The armature resistance and shunt field resistance are 0.02Ω and 50Ω respectively. The iron and friction losses equal 950W. Find (i) E.M.F generated (ii) Cu losses (iii) output of the prime motor (iv) commercial, mechanical and electrical efficiencies.	8 marks

Or

8	a	Discuss the following characteristics for i) series motor ii) shunt motor with relevant plots. i) Ta v/s Ia ii) N v/s Ia	8 marks
	b	Explain the function of following parts of D.C machine. i) Yoke ii) Field winding iii) Commutator iv) Pole shoe v) Pole core vi) Brush	6 marks
	c	A 500V shunt motor has 4 poles and a wave connected winding with 492 conductors. The flux per pole is 0.05Wb.the full load current is 20 Amps. The armature and shunt field resistances 0.1Ω and 250Ω respectively. Calculate the speed and the developed torque.	6 marks

Module – 5

9	a	Explain the working principle of 3 phase synchronous generator.	6 marks
	b	Derive an EMF equation for alternator with suitable considerations	8 marks
	c	A 3-phase, 12-pole alternator is coupled to an engine running at 500rpm. The alternator supplies an induction motor which has a full-load speed of 1455rpm.find the slip and number of poles of the motor	6 marks

Or

10	a	Describe the constructional features of 3 phase induction motor with suitable diagrams	8 marks
	b	With a circuit diagram explain the working of a star delta starter for a three phase induction motor	7 marks
	c	A 3 phase, 6 pole, star connected alternator has 48 slots and 12 conductors per slot on the armature. If the rotor at 1200rpm and Flux per pole is 0.3Wb. The winding factor and pitch factor is 0.95. Calculate the phase e.m.f and line e.m.f.	5 marks

*****

First Semester BE Examination July 2021

(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: Basic Electronics

Q P Code: 60008/60017

Instructions: 1**.** Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked**.**
4. write the same question numbers as they appear in this question paper**.**
5. Write Legibly

Module – 1

1 a Explain the operation of PN junction diode under forward and reverse bias conditions with the help of V-I characteristics curve.   7 marks

  b What is Zener diode? With neat circuit diagrams, explain the operation of a voltage regulator with and without load.   7 marks

  c A diode with VF = 0.7V is connected as a half wave rectifier, the load resistance is 600Ω and AC input is 24V(r m s).Determine (i) output voltage (ii) load current and (iii) diode peak inverse voltage.   6 marks

OR

2 a With a neat circuit diagram, explain the working of a two diode (centre-tapped) full-wave rectifier along with relevant waveforms.   8 marks

  b Write a note on: (i) Photodiode (ii) LED   8 marks

  c Distinguish between Zener and Avalanche breakdown.   4 marks

Module – 2

3 a Explain the construction and working of N-channel JFET.   9 marks

  b With a neat circuit diagram, explain the operation of a CMOS inverter.   7 marks

  c For the JFET in Figure.1,$V_{GS(off)=}$4V and I_{DSS}=12mA.Determine the minimum value of V_{DD} required to put the device in the constant-current region of operation when V_{GS}=0V.   4 marks
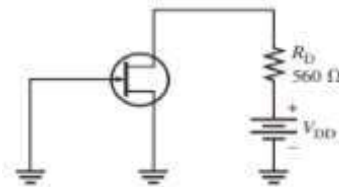
Figure.1

Or

4 a With neat diagram, explain the construction and characteristics of an enhancement type MOSFET.   9 marks

  b What is SCR? Explain the working of SCR using two-transistor model.   6 marks

  c Explain phase control application of SCR.   5 marks

Module – 3

5 a List and explain the characteristics of an ideal op-amp and mention the applications of op-amp   8 marks

PTO

b Refer to the op-amp in Figure.2. if v_i=0.5 V, calculate (a)the output voltage v_o, and (b)the current in the 10kΩ resistor. — 4 marks
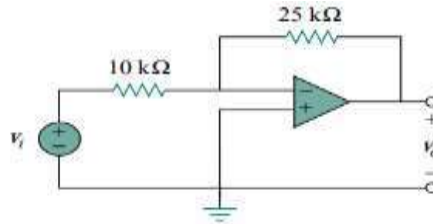
Figure.2

c Explain the operation of an op-amp as a non-inverting amplifier with neat diagram and waveforms. Derive the expression for output voltage. — 8 marks

Or

6 a Draw the three input inverting summer circuit and derive an expression for its output voltage. — 8 marks

b With a neat circuit diagram, show how an op-amp can be used as an integrator. Derive the expression for output voltage — 8 marks

c A certain op-amp has an open loop voltage gain of 1,00,000 and a common mode gain of 0.2. Determine the CMRR and express it in decibels. — 4 marks

Module – 4

7 a With neat circuit diagram, explain how transistor is used as a voltage amplifier. Derive an equation for voltage gain Av. — 8 marks

b Explain RC phase shift oscillator with circuit diagram and necessary equations. — 8 marks

c (a)Determine the value of R_f necessary for the circuit in Figure.3 to operate as an oscillator.
(b)Determine the frequency of the oscillation. — 4 marks
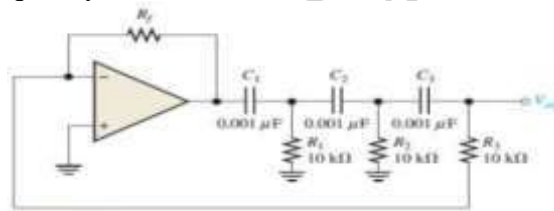
Figure.3

Or

8 a Explain the Barkhausens' criteria for oscillations — 6 marks

b With a neat circuit diagram, explain the working of Wien bridge oscillator. — 8 marks

c Explain with circuit, astable multivibrator using IC 555 — 6 marks

Module – 5

9 a State and prove De-Morgan's theorem. — 6 marks

b What are universal gates? Realize AND and OR gates using universal gates. — 5 marks

c Convert the following — 9 marks
i.$(1011.01)_2=(?)_{10}$ ii. $(A2B.1D)_{16}=(?)_{10}=(?)_2$
iii.$(1073.32)_8=(?)_2$ iv.$(1000111011.01101)_2=(?)_8=(?)_{16}$

Or

10 a Design a full adder and implement it using two half adders and write the equations for sum and carry. — 8 marks

b With the help of a logic diagram and truth table, explain the working of a clocked SR flip-flop. — 6 marks

c With a neat block diagram, explain the elements of a communication system. — 6 marks

*****

First/Second Semester BE Examination July 2021

(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: Elements of Mechanical Engineering

Q P Code: 60010/60019

Instructions: 1**.** Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked**.**
4. write the same question numbers as they appear in this question paper**.**
5. Write Legibly

Module – 1

1	a	Explain with a neat sketch working of Solar Power Plant	10 marks
	b	Define any five steam properties	10 marks

OR

2	a	Explain with a neat sketch working of Kaplan Turbines	10 marks
	b	Explain with a neat sketch working of Open cycle Gas Turbine	10 marks

Module – 2

3	a	Using PV diagram explain Diesel cycle	10 marks
	b	Following data are collected from a 4-stroke single cylinder oil engine at full load. Bore=200 mm, stroke = 280 mm, speed = 300 rpm, indicated mean effective pressure = 5.6 bar, torque on the brake drum=250 Nm, oil consumed = 4.2 kg/h and calorific value of oil = 41 MJ/kg. Calculate mechanical efficiency, indicated thermal efficiency and brake thermal efficiency.	10 marks

Or

4	a	Define the following
		  i. Refrigerating Effect
		  ii. Ton of Refrigeration
		  iii. Unit of Refrigeration
		  iv. Coefficient of Performance
		  v. Ice Making capacity
			10 marks

	b	Describe with a neat sketch the working of vapour Compression refrigerator.	10 marks

Module – 3

5	a	Explain the following operations with neat sketch (i) Knurling (ii) Counter Sinking (iii) Thread cutting	12 marks
	b	Explain Cylindrical Grinding with a neat sketch	08 marks

Or

6	a	Define Brazing and explain its working principle	10 marks
	b	Distinguish between the welding and Brazing	10 marks

Module – 4

7	a	Explain any 5 advantages of gear drives over belt drives	10 marks
	b	Explain with a neat sketch working of Idler Pulley	10 marks

Or

8	a	Explain any 5 properties of a good lubricant	10 marks
	b	Explain Ball & Roller Bearings	10 marks

Module – 5

9	a	Differentiate between Ferrous and non-Ferrous metals	10 marks
	b	Define Engineering materials and explain the composition and applications of any three types of steel	10 marks

Or

10	a	Broadly classify composite materials	10 marks
	b	What are the advantages and disadvantages of composite materials	10 marks

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Second Semester BE Examination July 2021

(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: Engineering Mathematics - II

Q P Code: 60012

Instructions: 1**.** Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked**.**
4. write the same question numbers as they appear in this question paper**.**
5. Write Legibly

Module – 1

1 a Find the directional derivatives of $\phi = x^2yz + 4xz^2$ at (1, -2, -1) along 2i - j - 2k.   6 marks

   b If $\vec{A} = (3x^2y - z)i + (xz^3 + y^4)j - 2x^3z^2k$, find $grad(div\vec{A})$ at (2,-1,0).   7 marks

   c Show that $\vec{F} = (y + z)i + (z + x)j + (x + y)k$ is irrotational. Also find a scalar function ϕ such that $\vec{F} = \nabla \phi$.   7 marks

OR

2 a If $\vec{F} = \nabla (xy^3z^2)$ find $div\vec{F}$ and $curl\vec{F}$ at the point (1, -1, 1).   6 marks

   b If $\vec{r} = xi + yj + zk$ and $r = |\vec{r}|$ prove that $\nabla (r^n) = nr^{n-2}\vec{r}$.   7 marks

   c Show that $\vec{F} = \frac{xi+yj}{x^2+y^2}$ is both solenoidal and irrotational.   7 marks

Module – 2

3 a Solve : $\frac{d^3y}{dx^3} - 2\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 8y = 0$.   6 marks

   b Solve : $y'' + 3y' + 2y = 12x^2$.   7 marks

   c Solve : $(2x + 1)^2y'' - 6(2x + 1)y' + 16y = 8(2x + 1)^2$.   7 marks

Or

4 a Solve : $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x$.   6 marks

   b Solve by the method of variation of parameters $y'' + y = tanx$.   7 marks

   c Solve : $x^2 \frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = x^2logx$.   7 marks

Module – 3

5 a Form the partial differential equation by eliminating the arbitrary constants $ax^2 + by^2 + z^2 = 1$.   6 marks

   b Solve $\frac{\partial^2 z}{\partial x \partial y} = sinx. siny$ for which $\frac{\partial z}{\partial y} = -2siny$ when x = 0 & z = 0 if y is an odd multiple of $\frac{\pi}{2}. or \left[z = 0 \text{ if } y = (2n + 1)\frac{\pi}{2}\right]$.   7 marks

   c Derive an expression for one dimensional wave equation.   7 marks

PTO

<div align="center">

Or

</div>

6   a   Form the PDE by eliminating the arbitrary function : $z = e^{ax+by}f(ax - by)$.   6marks

     b   Solve : $\frac{\partial^2 z}{\partial y^2} = z$ given that when $y = 0$, $z = e^x$ & $\frac{\partial z}{\partial y} = e^{-x}$.   7 marks

     c   Discuss the variable possible solution of one dimensional heat equation.   7 marks

<div align="center">

Module – 4

</div>

7   a   Discuss the convergence of $\sum_{n=1}^{\infty}(1 + \frac{1}{n})^{n^2}$ by using Cauchy's root test.   6 marks

     b   Test the convergence of series using D'Alembert's ratio test   7 marks

         $\frac{3}{4+1} + \frac{3^2}{4^2+1} + \frac{3^3}{4^3+1} + \frac{3^4}{4^4+1} + \cdots$

     c   Obtain the series solution of the equation $\frac{d^2 y}{dx^2} + y = 0$.   7 marks

<div align="center">

Or

</div>

8   a   Discuss the convergence of $\sum_{n=1}^{\infty}\left(\frac{n+1}{n}\right)^{n^2}\frac{1}{3^n}$ by using Cauchy's root test.   6marks

     b   Prove that $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}}\sin x$.   7 marks

     c   If $x^3 + 2x^2 - x + 1 = aP_0(x) + bP_1(x) + cP_2(x) + dP_3(x)$ find the values of a,b,c,d.   7 marks

<div align="center">

Module – 5

</div>

9   a   From the following table find the number of students who have obtained   6marks
         (a) less than 45 marks   (b) between 40 and 45 marks.

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

     b   Use Lagrange's interpolation formula to find y(2).   7 marks

x	0	1	3	4
y	-12	0	6	12

     c   Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's $1/3^{rd}$ rule taking four equal strips and hence deduce an approximate value of π.   7 marks

<div align="center">

Or

</div>

10   a   Apply Newton's divided difference formula to find f(4) for the given data :   6 marks

x	0	2	3	6
f(x)	-4	2	14	158

     b   Apply Newton-Raphson method to find an approximate root of the equation $x^3 - 2x - 5 = 0$ which lies near x = 2.   7 marks

     c   Use weddle's rule to compute the area bounded by the curve $y = f(x)$, x-axis and the extreme ordinates from the following table.   7 marks

x	0	1	2	3	4	5	6
y	0	2	2.5	2.3	2	1.7	1.5

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ADICHUNCHANAGIRI UNIVERSITY

18EGH18

First Semester BE Degree Examination July 2021
(CBCS Scheme)

Time: 3 Hours

Max Marks: 100 marks

Sub: ENGLISH I

Q P Code: 60001

Instructions: 1. Your answer should be specific to the questions asked**.**
2. write the same question numbers as they appear in this question paper**.**
3. Write Legibly

Question Paper Version – A

Answer all the questions   **100X1=100**

1 The students who apply to engineering colleges drop out because of lack of guidance.

   A. True   B. False   C. Neutral   D. Not applicable

2 The students are not responsible for the decisions that they take to join engineering.

   A. True   B. False   C. Neutral   D. Not applicable

3 There is a massive difference between what a college expects than a school from its students.

   A. True   B. False   C. Neutral   D. Not applicable

4 The students must have clear picture of what they want to become after engineering right from 1st year of engineering.
   A. True   B. False   C. Neutral   D. Not applicable

5 The students must not approach the library for referring to books which is prescribed in the syllabus.

   A. True   B. False   C. Neutral   D. Not applicable

6   An engineer, in order to be performing well in their career must have only technical knowledge.

   A. True   B. False   C. Neutral   D. Not applicable

7 Engineers are the reasons for which the commerce, trade and marketing has experienced drastic improvement.
   A. True   B. False   C. Neutral   D. Not applicable

8 In order to be an effective engineer, one must pay closer and keen attention to minutest details.

   A. True   B. False   C. Neutral   D. Not applicable

9 Engineers do not require leadership as well as management skills.

   A. True   B. False   C. Neutral   D. Not applicable

10 Engineers know the value of time.

   A. True   B. False   C. Neutral   D. Not applicable

11 _____ mom is on the phone.

   A. You B. YourC. You're   D. Yours

PTO

12   _____ looking a lot better than you diD.

A. You   B. Your   C. You're   D. Yours

13   If _____ in town, come by and see us.

A. You   B. Your   C. You're   D. Yours

14   If you do it again _____ certain to get sent to the office.

A. You   B. Your   C. You're   D. Yours

15   Was it _____ brother i saw last week?

A. You   B. Your   C. You're   D. Yours

16   I hope that _____ happy in your new joB.

A. You   B. Your   C. You're   D. Yours

17   I hope you get lots of presents on _____ birthday.

A. You   B. Your   C. You're   D. Yours

18   _____ not going out looking like that.

A. You   B. Your   C. You're   D. Yours

19   I'm coming over to _____ house to sort this out.

A. You   B. Your   C. You're   D. Yours

20   Do you know where _____ going?

A. You   B. Your   C. You're   D. Yours

21   The applause showed how deeply the presentation had _____ the audience.

A. Affect   B. Effect   C. Affected   D. Effected

22   His attitude was _____ by his upbringing.

A. Affect   B. Effect   C. Affected   D. Effected

23   No matter what he does, it will have no _____ on me.

A. Affect   B. Effect   C. Affected   D. Effected

24   No matter what he does, it will not _____ me.

A. Affect   B. Effect   C. Affected   D. Effected

25   How was the team _____ by the loss of their coach?

A. Affect   B. Effect   C. Affected   D. Effected

26   What is the type of introduction called, when it is required to introduce yourself in quick time frame?

A. Self introduction   B. Group introduction   C. Elevator introduction   D. None of these

27 Choose the best option which suits the best for professional introduction.

A. Dress appropriately   B. Keep eye contact C. Be confident D. All of these

28 A non – formally prepared speech is calleD.

A. Extempore speaking B. Presentation C. Debate   D. None of these

29 Which of these element is not involved in the process of communication?

A. Pipe B. Sender   C. Message   D. Channel

30 Which of these is the third element of communication?

A. Sender   B. Reciver   C. Channel   D. Message

31 Which of these is the most important tool of communication?

A. Body language B. Gestures C. Language   D. Posture

32 Which of these must be avoided in any presentation?

A. Proper grammar   B. Complex words   C. Short sentences   D. Clear voice

33 Which of these is not important in an oral presentation?

A. Words   B. Body language   C. Gestures   D. Audience size

34 Which of these is the best way to establish a proper rapport with audience?

A. Pointing finger   B. Making eye contact C. Waving hands   D.standing erect

35 In an oral presentation, the speaker should not _____

A. Panic   B. Pause   C. Making eye contact   D. Inspire

36 Which number among the following is divisible by 7?

A.77754   B. 7666   C. 77784   D. 5643

37 Which number among the following is divisible by 8?

A.762928   B. 220953   C. 19537455   D. None of these

38 Which number among the following is divisible by both 7 and 11?

A.4540074   B. 293076   C. 1793498   D. 5740702

39 Which of the following number is divisible by 63?

A.492815   B. 4107872   C. 5893407   D. 6221628

40 Which number is divisible by 18?

A.52794   B. 432181   C. 1725516   D. None of these

41 What is the unit digit in the product (365 x 659 x 771)?

A.1   B. 2   C. 4   D. 6

42 What is the unit digit in 7105

a. 1   B. 5   C. 7   D. 9

43 How many 3-digit numbers are completely divisible 6?

a. 140   B. 150   C. 151   D. 166

44 (112 + 122 + 132 + ... + 202) = ?

A. 398   B. 2485   C. 4232   D.1563

45   What is the unit digit in(795 - 358)?

A. 0   B.4   C. 6   D. 7

46 What will be remainder when 17200 is divided by 18 ?

a. 17   B. 16   C. 1   D. 2

47 When a number is divided by 13, the remainder is 11. When the same number is divided by 17, then remainder is 9. What is the number?

A. 339   B. 349   C. 369   D. None of these

48 In a division sum, the divisor is 10 times the quotient and 5 times the remainder. If the remainder is 46, what is the dividend?

A. 4236   B. 4036   C. 4336   D. 5336

49 On dividing a number by 357, we get 39 as remainder. On dividing the same number 17, what will be the remainder?

A. 0   B. 3   C. 5   D. 11

50 On dividing a number by 5, we get 3 as remainder. What will the remainder when the square of the number is divided by 5?

A. 0   B. 1   C. 2   D. 4

51 How many of the following numbers are divisible by 3 but not by 9 ?
2133, 2343, 3474, 4131, 5286, 5340, 6336, 7347, 8115, 9276

a. 5   B. 6   C. 7   D. None of these

52 The difference between the place value and the face value of 6 in the numeral 856973 is

a. 973   B. 5994   C. 5973   D. 435

53 The smallest 6 digit number exactly divisible by 111 is:

a. 111111   B. 11077   C. 100011   D. 2233109

54 The largest 5 digit number exactly divisible by 91 is:

a. 88899   B. 99918   C. 45361   D. 98978

55 What is the unit digit in (4137)754?

a. 1   B. 3   C. 7   D. 9

Read the following passages and answer the questions given below
(q56 – 65)

The greening of the aged

1. A visit to most homes for the aged is so depressing that second visits are uncommon. The men and women we see there are listless, unresponsive, and often incapable of performing simple tasks. They appear unmotivated, uninterested, and turned away from others. Their debilitated physical and emotional condition is not a necessary consequence of old age. Rather, it is the inevitable result of being treated like a passive object in an institutional setting.

2. Recently, two young researchers from yale university, ellen langer and judith rodin, decided to see whether they could reverse the debilitated condition of residents in one of these old-age homes (1976). Their sample consisted of 91 residents, aged 65 to 90, all well enough to be walking about. The investigators reasoned that the crucial psychological process missing in such institutions was taking responsibility for one's own decisions. To be an actor in life's drama, we must act, decide, and be responsible for the consequences. To let others decide for us is to lose the main ingredient in self-esteem and competence.

56 How are the residents of old age homes described in paragraph 1?

A. Healthy   B. Sad   C. Uncommon   D. Weak, poor and troubled

57 According to the author, what is the reason for their poor condition?

A. Left out feel B. Uninterested C. Ill treated like a passive object   D. None of these

58 (par. 2) what was the researchers' hypothesis; i.e., what idea was their research based on?

A. Improving self esteem   B. Taking responsibility   C.less competence   D. Change the condition of the poor

59 (par. 2) what is the main ingredient in self-esteem and confidence?

A. Act and decide   B. Decision making C. Debilated condition D.none of these

3. Accordingly, about half of the participants in the study were randomly assigned to a situation in which they received instructions that emphasized the need for them to take more responsibility for caring for themselves and for improving the quality of life in the home. They were then asked to choose a plant from among a box of them as a present – but they were told they had to care for it. In contrast, the second group of patients was given instructions that stressed the responsibility of the staff to provide good services for the residents. They were handed a plant as a present and informed that the nurses would water it for them.

4. The results of the enhanced sense of personal responsibility were dramatiC. On questionnaire ratings and behavioral measures, the experimental group ("i'll do it myself") showed significant improvement over the comparison group ("let george do it for you") on alertness, active participation, and general sense of well-being.

60 (par. 4) how did the researchers measure the results of the study?

A. Questionnaire ratings B. Behavioral meausres   C.questionnaire   ratings   and   behavioral measures D. None of these

61 Which group improved more?

A. Experimental   B. Comparison C. Both D. None of these

62 In what areas did the better group show improvement?

A. Alertness B. Active participation C. Sense of well being   D. All of these

5. Eighteen months later, these positive results still persisted, as indicated by the nurses' higher ratings of the happiness, sociability, and vigor of the personally responsible group. But most startling of all, encouraging the residents to be responsible for themselves and their plants made them live longer! The overall death rate for the entire nursing home during an eighteen-month period prior to the experiment was 25 percent. Following the experiment, only 15 percent of the personally responsible residents died, compared to twice as many for the no-responsibility group.

6. In conclusion, psychological interventions of this kind not only improve mood and attitudes; they seem to affect the very process of life and death itself.

63 (par. 5) how were results 18 months later?

A. Results perished   B. No change   C. Results remained D. None of these

64 What was the most surprising finding of the study?

A. None changed   B. Residents became brave   C. Their plants made them live longer   D. None of these

65 Choose the correct conclusion from the options given below.

A. Residents can be changed   B. Psychological interventions help residents   C. People will not die
D. None of these

66 When we read only to find the answer, this technique is calleD.

A. Skimming   B. Scanning   C. Churning   D. Wringing

67 When we read by skipping through sections of a passge, this technique is calleD.

A. Skimming   B. Scanning   C. Churning   D. Wringing

68 When we read only the headings to identify the answer, this technique is calleD.

A. Skimming   B. Scanning   C. Churning   D. Wringing

69 Which technique helps you to read upto 1000 words a minute?

A. Skimming   B. Scanning   C. Churning   D. Wringing

70 Which technique is very useful to identify which section of a passage is to be read?

A. Skimming   B. Scanning   C. Churning   D. Wringing

71 In the 5 stages of listening process which stage is 'remembering'?

A. Stage 1   B. Stage 2 C. Stage 3   D. Stage 4

72 In the 5 stages of listening process which stage is 'recieving'?

A. Stage 1   B. Stage 2 C. Stage 3   D. Stage 4

73 In the 5 stages of listening process which stage is 'understanding'?

A. Stage 1   B. Stage 2 C. Stage 3   D. Stage 5

74 In the 5 stages of listening process which stage is 'evaluating'?

A. Stage 4   B. Stage 1 C. Stage 3   D. Stage 5

75   In the 5 stages of listening process which stage is 'responding'?

    A. Stage 4   B. Stage 1 C. Stage 3   D. Stage 5

76   What is the barrier of listening called if a person has hearing problems?

    A. Egotism   B. Rapid thoughts   C. Impaired hearing   D. None of these

77   What is the barrier of listening called if a person's mind wanders onto topics which are not related to speaker's words?

    A. Egotism   B. Rapid thoughts   C. Impaired hearing   D. None of these

78   What is the barrier of listening called if a person is given a lot of information to receive?

    A. Egotism   B. Rapid thoughts   C. Overloaded messages D. None of these

79   What is the barrier of listening called if a person cannot understand the accent spoken by the speaker?

    A. Faulty assumptions B. Cultural differences C. Egotism D. None of these

80   What is the barrier of listening called if a person thinks listening is merely a passive activity?

    A. Faulty assumptions B. Cultural differences C. Egotism D. None of these

81   P5qr, p4qs, p3qt, _____, p1qv

    A. Pqw   B. Pqv2   C. P2qu   D. Pq3u

82   Qpo, nml, kji, _____, edc

    A. Hgf   B. Cab   C. Jkl   D. Ghi

83   scd, tef, ugh, ____, wkl

    A. Cmn   B. Uji   C. Vij   D. Ijt

84   Elfa, glha, ilja, _____, mlna

    A. Olpa   B. Klma   C. Llma   D. Klla

85   In a certain code, sikkim is written as thljjl, how is training written in that code?

    A. Sqbhohof   B. Uqbhoiof   C. Uqbhohoi   D. Uqbhohof

86   If completed is coded as mocelpdet, then direction will be coded as:

    A. Ridtcenoj   B. Sidtcenoi   C. Ridtcenoi   D. Rietcenoi

87   Eat+that=apple. What is a+l+t?

    A.13   B. 10   C. 11   D. 9

88   Send+more=money. What is m+o+n+e+y?

    A.11   B.12   C. 13   D. 14

89   base+ball=games. What is g+a+m+e+s?

   A.21   B. 23   C. 25   D. 29

90   lets+wave=later. What is l+a+t+e+r?

   A.12   B. 13   C. 14   D. 15

91   donald+gerald=robert. What is r+o+b+e+r+t?

   A.22   B. 24   C. 26   D. 2

92   Scd, tef, ugh, _____, wkl

   A.cmn   B.uji   C.vij   D. Ijt

93   Fag, gaf, hai, iah, _____

   A.jak   B. Hal   C. Hal   D. Hai

94   Elfa, glha, ilja, _____, mlna

   A. Olpa   B. Klma   C. Llma   D. Klla

95   Elf+elf=fool. What is f+o+o+l?

   A.11   B. 12   C. 13   D. 14

96   Roads+cross=danger. What is d+a+n+g+e+r?

   A. 28   B. 31   C. 33   D. 35

97   Rab, scd, tef, _____, vij

   A.gvh   B. Ugh   C. Uvg   D.hgu

98   Srq, pon, mlk, _____, gfe

   A. Ijh   B. Jih   C. Jhi   D. Ihj

99   Kel, lfm, mgn, nho, oip, _____

   A.jpo   B. Pjo   C. Pjq   D. None of these

100   E2hi,_____, ehi4, e5hi, eh6i

   A. Eh3i   B. Ei3h   C. I2e3h   D. None of these

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18EGH18

First Semester BE Degree Examination July 2021
(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: ENGLISH I

Q P Code: 60001

Instructions: 1. Your answer should be specific to the questions asked.

            2. write the same question numbers as they appear in this question paper.

            3. Write Legibly

Question Paper Version – B

Answer all the questions   **100X1=100**

1. How many of the following numbers are divisible by 3 but not by 9 ?
2133, 2343, 3474, 4131, 5286, 5340, 6336, 7347, 8115, 9276

   a. 5   B. 6   C. 7   D. None of these

2. The difference between the place value and the face value of 6 in the numeral 856973 is

   a. 973   B. 5994   C. 5973   D. 435

3. The smallest 6 digit number exactly divisible by 111 is:

   a. 111111   B. 11077   C. 100011   D. 2233109

4. The largest 5 digit number exactly divisible by 91 is:

   a. 88899   B. 99918   C. 45361   D. 98978

5. What is the unit digit in $(4137)754$?

   a. 1   B. 3   C. 7   D. 9

Read the following passages and answer the questions given below
(q06 – 15)

The greening of the aged

1. A visit to most homes for the aged is so depressing that second visits are uncommon. The men and women we see there are listless, unresponsive, and often incapable of performing simple tasks. They appear unmotivated, uninterested, and turned away from others. Their debilitated physical and emotional condition is not a necessary consequence of old age. Rather, it is the inevitable result of being treated like a passive object in an institutional setting.

2. Recently, two young researchers from yale university, ellen langer and judith rodin, decided to see whether they could reverse the debilitated condition of residents in one of these old-age homes (1976). Their sample consisted of 91 residents, aged 65 to 90, all well enough to be walking about. The investigators reasoned that the crucial psychological process missing in such institutions was taking responsibility for one's own decisions. To be an actor in life's drama, we must act, decide, and be responsible for the consequences. To let others decide for us is to lose the main ingredient in self-esteem and competence.

PTO

6   How are the residents of old age homes described in paragraph 1?

    A. Healthy   B. Sad   C. Uncommon   D. Weak, poor and troubled

7   According to the author, what is the reason for their poor condition?

    A. Left out feel B. Uninterested C. Ill treated like a passive object   D. None of these

8   (par. 2) what was the researchers' hypothesis; i.e., what idea was their research based on?

    A. Improving self esteem   B. Taking responsibility   C.less competence   D. Change the condition of the poor

9   (par. 2) what is the main ingredient in self-esteem and confidence?

    A. Act and decide   B. Decision making C. Debilated condition D.none of these

    3. Accordingly, about half of the participants in the study were randomly assigned to a situation in which they received instructions that emphasized the need for them to take more responsibility for caring for themselves and for improving the quality of life in the home. They were then asked to choose a plant from among a box of them as a present – but they were told they had to care for it. In contrast, the second group of patients was given instructions that stressed the responsibility of the staff to provide good services for the residents. They were handed a plant as a present and informed that the nurses would water it for them.

    4. The results of the enhanced sense of personal responsibility were dramatiC. On questionnaire ratings and behavioral measures, the experimental group ("i'll do it myself") showed significant improvement over the comparison group ("let george do it for you") on alertness, active participation, and general sense of well-being.

10 (par. 4) how did the researchers measure the results of the study?

    A. Questionnaire ratings   B. Behavioral meausres   C.questionnaire   ratings   and   behavioral measures D. None of these

11 Which group improved more?

    A. Experimental   B. Comparison C. Both D. None of these

12 In what areas did the better group show improvement?

    A. Alertness B. Active participation C. Sense of well being   D. All of these

    5. Eighteen months later, these positive results still persisted, as indicated by the nurses' higher ratings of the happiness, sociability, and vigor of the personally responsible group. But most startling of all, encouraging the residents to be responsible for themselves and their plants made them live longer! The overall death rate for the entire nursing home during an eighteen-month period prior to the experiment was 25 percent. Following the experiment, only 15 percent of the personally responsible residents died, compared to twice as many for the no-responsibility group.

    6. In conclusion, psychological interventions of this kind not only improve mood and attitudes; they seem to affect the very process of life and death itself.

13 (par. 5) how were results 18 months later?

    A. Results perished   B. No change   C. Results remained D. None of these

14 What was the most surprising finding of the study?

    A. None changed   B. Residents became brave   C. Their plants made them live longer   D. None of these

15 Choose the correct conclusion from the options given below.

    A. Residents can be changed   B. Psychological interventions help residents   C. People will not die
    D. None of these

16 When we read only to find the answer, this technique is calleD.

    A. Skimming   B. Scanning   C. Churning   D. Wringing

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31   P5qr, p4qs, p3qt, _____, p1qv

    A. Pqw   B. Pqv2   C. P2qu   D. Pq3u

32   Qpo, nml, kji, _____, edc

    A. Hgf   B. Cab   C. Jkl   D. Ghi

33   scd, tef, ugh, ____, wkl

    A. Cmn   B. Uji   C. Vij   D. Ijt

34   Elfa, glha, ilja, _____, mlna

    A. Olpa   B. Klma   C. Llma   D. Klla

35   In a certain code, sikkim is written as thljjl, how is training written in that code?

    A. Sqbhohof   B. Uqbhoiof   C. Uqbhohoi   D. Uqbhohof

36   If completed is coded as mocelpdet, then direction will be coded as:

    A. Ridtcenoj   B. Sidtcenoi   C. Ridtcenoi   D. Rietcenoi

37   Eat+that=apple. What is a+l+t?

    A.13   B. 10   C. 11   D. 9

38   Send+more=money. What is m+o+n+e+y?

    A.11   B.12   C. 13   D. 14

39   base+ball=games. What is g+a+m+e+s?

    A.21   B. 23   C. 25   D. 29

40   lets+wave=later. What is l+a+t+e+r?

    A.12   B. 13   C. 14   D. 15

41   donald+gerald=robert. What is r+o+b+e+r+t?

    A.22   B. 24   C. 26   D. 2

42   Scd, tef, ugh, ____, wkl

    A.cmn   B.uji   C.vij   D. Ijt

43   Fag, gaf, hai, iah, ____

    A.jak   B. Hal   C. Hal   D. Hai

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A. 28   B. 31   C. 33   D. 35

47   Rab, scd, tef, _____, vij

A.gvh   B. Ugh   C. Uvg   D.hgu

48   Srq, pon, mlk, _____, gfe

A. Ijh   B. Jih   C. Jhi   D. Ihj

49   Kel, lfm, mgn, nho, oip, _____

A.jpo   B. Pjo   C. Pjq   D. None of these

50   E2hi,_____, ehi4, e5hi, eh6i

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51   The students who apply to engineering colleges drop out because of lack of guidance.

A. True   B. False   C. Neutral   D. Not applicable

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61 _____ mom is on the phone.

A. You B. Your   C. You're   D. Yours

62 _____ looking a lot better than you diD.

A. You B. Your   C. You're   D. Yours

63 If _____ in town, come by and see us.

A. You B. YourC. You're   D. Yours

64 If you do it again _____ certain to get sent to the office.

A. You B. YourC. You're   D. Yours

65 Was it _____ brother i saw last week?

A. You B. YourC. You're   D. Yours

66 I hope that _____ happy in your new joB.

A. You   B. Your   C. You're   D. Yours

67 I hope you get lots of presents on _____ birthday.

A. You B. Your   C. You're   D. Yours

68 _____ not going out looking like that.

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69 I'm coming over to _____ house to sort this out.

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70 Do you know where _____ going?

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71 The applause showed how deeply the presentation had _____ the audience.

A. Affect   B. Effect   C. Affected   D. Effected

72 His attitude was _____ by his upbringing.

A. Affect   B. Effect   C. Affected   D. Effected

73 No matter what he does, it will have no _____ on me.

A. Affect   B. Effect   C. Affected   D. Effected

74 No matter what he does, it will not _____ me.

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75 How was the team _____ by the loss of their coach?

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76 What is the type of introduction called, when it is required to introduce yourself in quick time frame?

A. Self introduction B. Group introduction C. Elevator introduction   D. None of these

77 Choose the best option which suits the best for professional introduction.

A. Dress appropriately   B. Keep eye contact C. Be confident D. All of these

78 A non – formally prepared speech is calleD.

A. Extempore speaking B. Presentation C. Debate   D. None of these

79 Which of these element is not involved in the process of communication?

A. Pipe B. Sender   C. Message   D. Channel

80 Which of these is the third element of communication?

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86 Which number among the following is divisible by 7?

A.77754   B. 7666   C. 77784   D. 5643

87 Which number among the following is divisible by 8?

A.762928   B. 220953   C. 19537455   D. None of these

88 Which number among the following is divisible by both 7 and 11?

A.4540074   B. 293076   C. 1793498   D. 5740702

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90 Which number is divisible by 18?

A.52794   B. 432181   C. 1725516   D. None of these

91   What is the unit digit in the product (365 x 659 x 771)?

    A.1   B. 2   C. 4   D. 6

92   What is the unit digit in 7105

    a. 1   B. 5   C. 7   D. 9

93   How many 3-digit numbers are completely divisible 6?

    a. 140   B. 150   C. 151   D. 166

94   (112 + 122 + 132 + ... + 202) = ?

    A. 398   B. 2485   C. 4232   D.1563

95   What is the unit digit in(795 - 358)?

    A. 0   B.4   C. 6   D. 7

96   What will be remainder when 17200 is divided by 18 ?

    a. 17   B. 16   C. 1   D. 2

97   When a number is divided by 13, the remainder is 11. When the same number is divided by 17, then remainder is 9. What is the number?

    A. 339   B. 349   C. 369   D. None of these

98   In a division sum, the divisor is 10 times the quotient and 5 times the remainder. If the remainder is 46, what is the dividend?

    A. 4236   B. 4036   C. 4336   D. 5336

99   On dividing a number by 357, we get 39 as remainder. On dividing the same number 17, what will be the remainder?

    A. 0   B. 3   C. 5   D. 11

100   On dividing a number by 5, we get 3 as remainder. What will the remainder when the square of the number is divided by 5?

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****

18EGH18

First Semester BE Degree Examination July 2021
(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: ENGLISH I

Q P Code: 60001

Instructions: 1. Your answer should be specific to the questions asked.
2. write the same question numbers as they appear in this question paper.
3. Write Legibly

Question Paper Version – C

Answer all the questions   **100X1=100**

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26   How many of the following numbers are divisible by 3 but not by 9 ?
2133, 2343, 3474, 4131, 5286, 5340, 6336, 7347, 8115, 9276
a. 5   B. 6   C. 7   D. None of these

27   The difference between the place value and the face value of 6 in the numeral 856973 is

| a. 973 | B. 5994 | C. 5973 | D. 435 |

28 The smallest 6 digit number exactly divisible by 111 is:

a. 111111   B. 11077   C. 100011   D. 2233109

29 The largest 5 digit number exactly divisible by 91 is:

a. 88899   B. 99918   C. 45361   D. 98978

30 What is the unit digit in (4137)754?

a. 1   B. 3   C. 7   D. 9

Read the following passages and answer the questions given below
(q31 – 40)

The greening of the aged

1. A visit to most homes for the aged is so depressing that second visits are uncommon. The men and women we see there are listless, unresponsive, and often incapable of performing simple tasks. They appear unmotivated, uninterested, and turned away from others. Their debilitated physical and emotional condition is not a necessary consequence of old age. Rather, it is the inevitable result of being treated like a passive object in an institutional setting.

2. Recently, two young researchers from yale university, ellen langer and judith rodin, decided to see whether they could reverse the debilitated condition of residents in one of these old-age homes (1976). Their sample consisted of 91 residents, aged 65 to 90, all well enough to be walking about. The investigators reasoned that the crucial psychological process missing in such institutions was taking responsibility for one's own decisions. To be an actor in life's drama, we must act, decide, and be responsible for the consequences. To let others decide for us is to lose the main ingredient in self-esteem and competence.

31 How are the residents of old age homes described in paragraph 1?

A. Healthy   B. Sad   C. Uncommon   D. Weak, poor and troubled

32 According to the author, what is the reason for their poor condition?

A. Left out feel   B. Uninterested   C. Ill treated like a passive object   D. None of these

33 (par. 2) what was the researchers' hypothesis; i.e., what idea was their research based on?

A. Improving self esteem   B. Taking responsibility   C.less competence   D. Change the condition of the poor

34 (par. 2) what is the main ingredient in self-esteem and confidence?

A. Act and decide   B. Decision making   C. Debilated condition   D.none of these

3. Accordingly, about half of the participants in the study were randomly assigned to a situation in which they received instructions that emphasized the need for them to take more responsibility for caring for themselves and for improving the quality of life in the home. They were then asked to choose a plant from among a box of them as a present – but they were told they had to care for it. In contrast, the second group of patients was given instructions that stressed the responsibility of the staff to provide good services for the residents. They were handed a plant as a present and informed that the nurses would water it for them.

4. The results of the enhanced sense of personal responsibility were dramatiC. On questionnaire ratings and behavioral measures, the experimental group ("i'll do it myself") showed significant improvement over the comparison group ("let george do it for you") on alertness, active participation, and general sense of well-being.

35 (par. 4) how did the researchers measure the results of the study?

A. Questionnaire ratings   B. Behavioral meausres   C.questionnaire   ratings   and   behavioral measures D. None of these

36   Which group improved more?

A. Experimental   B. Comparison C. Both D. None of these

37   In what areas did the better group show improvement?

A. Alertness B. Active participation C. Sense of well being   D. All of these

5. Eighteen months later, these positive results still persisted, as indicated by the nurses' higher ratings of the happiness, sociability, and vigor of the personally responsible group. But most startling of all, encouraging the residents to be responsible for themselves and their plants made them live longer! The overall death rate for the entire nursing home during an eighteen-month period prior to the experiment was 25 percent. Following the experiment, only 15 percent of the personally responsible residents died, compared to twice as many for the no-responsibility group.

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97   His attitude was _____ by his upbringing.

     A. Affect   B. Effect   C. Affected   D. Effected

98   No matter what he does, it will have no _____ on me.

     A. Affect   B. Effect   C. Affected   D. Effected

99   No matter what he does, it will not _____ me.

     A. Affect   B. Effect   C. Affected   D. Effected

100   How was the team _____ by the loss of their coach?

A. Affect   B. Effect   C. Affected   D. Effected

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ADICHUNCHANAGIRI UNIVERSITY

18EGH18

First Semester BE Degree Examination July 2021
(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: ENGLISH I

Q P Code: 60001

Instructions: 1. Your answer should be specific to the questions asked.

              2. write the same question numbers as they appear in this question paper.

              3. Write Legibly

Question Paper Version – D

Answer all the questions   100X1=100

1   When we read only to find the answer, this technique is calleD.

    A. Skimming   B. Scanning   C. Churning   D. Wringing

2   When we read by skipping through sections of a passge, this technique is calleD.

    A. Skimming   B. Scanning   C. Churning   D. Wringing

3   When we read only the headings to identify the answer, this technique is calleD.

    A. Skimming   B. Scanning   C. Churning   D. Wringing

4   Which technique helps you to read upto 1000 words a minute?

    A. Skimming   B. Scanning   C. Churning   D. Wringing

5   Which technique is very useful to identify which section of a passage is to be read?

    A. Skimming   B. Scanning   C. Churning   D. Wringing

6   In the 5 stages of listening process which stage is 'remembering'?

    A. Stage 1   B. Stage 2   C. Stage 3   D. Stage 4

7   In the 5 stages of listening process which stage is 'recieving'?

    A. Stage 1   B. Stage 2   C. Stage 3   D. Stage 4

8   In the 5 stages of listening process which stage is 'understanding'?

    A. Stage 1   B. Stage 2   C. Stage 3   D. Stage 5

9   In the 5 stages of listening process which stage is 'evaluating'?

    A. Stage 4   B. Stage 1   C. Stage 3   D. Stage 5

10 In the 5 stages of listening process which stage is 'responding'?

A. Stage 4   B. Stage 1 C. Stage 3   D. Stage 5

11 What is the barrier of listening called if a person has hearing problems?

A. Egotism   B. Rapid thoughts C. Impaired hearing   D. None of these

12 What is the barrier of listening called if a person's mind wanders onto topics which are not related to speaker's words?

A. Egotism   B. Rapid thoughts C. Impaired hearing   D. None of these

13 What is the barrier of listening called if a person is given a lot of information to receive?

A. Egotism   B. Rapid thoughts   C. Overloaded messages D. None of these

14 What is the barrier of listening called if a person cannot understand the accent spoken by the speaker?

A. Faulty assumptions B. Cultural differences C. Egotism D. None of these

15 What is the barrier of listening called if a person thinks listening is merely a passive activity?

A. Faulty assumptions B. Cultural differences C. Egotism D. None of these

16 P5qr, p4qs, p3qt, _____, p1qv

A. Pqw   B. Pqv2   C. P2qu   D. Pq3u

17 Qpo, nml, kji, _____, edc

A. Hgf   B. Cab   C. Jkl   D. Ghi

18 scd, tef, ugh, ____, wkl

A. Cmn   B. Uji   C. Vij   D. Ijt

19 Elfa, glha, ilja, _____, mlna

A. Olpa   B. Klma   C. Llma   D. Klla

20 In a certain code, sikkim is written as thljjl, how is training written in that code?

A. Sqbhohof   B. Uqbhoiof   C. Uqbhohoi   D. Uqbhohof

21 If completed is coded as mocelpdet, then direction will be coded as:

A. Ridtcenoj   B. Sidtcenoi   C. Ridtcenoi   D. Rietcenoi

22 Eat+that=apple. What is a+l+t?

A.13   B. 10   C. 11   D. 9

23 Send+more=money. What is m+o+n+e+y?

A.11   B.12   C. 13   D. 14

24 base+ball=games. What is g+a+m+e+s?

A.21   B. 23   C. 25   D. 29

25   lets+wave=later. What is l+a+t+e+r?

A.12   B. 13   C. 14   D. 15

26   donald+gerald=robert. What is r+o+b+e+r+t?

A.22   B. 24   C. 26   D. 2

27   Scd, tef, ugh, _____, wkl

A.cmn   B.uji   C.vij   D. Ijt

28   Fag, gaf, hai, iah, _____

A.jak   B. Hal   C. Hal   D. Hai

29   Elfa, glha, ilja, _____, mlna

A. Olpa   B. Klma   C. Llma   D. Klla

30   Elf+elf=fool. What is f+o+o+l?

A.11   B. 12   C. 13   D. 14

31   Roads+cross=danger. What is d+a+n+g+e+r?

A. 28   B. 31   C. 33   D. 35

32   Rab, scd, tef, _____, vij

A.gvh   B. Ugh   C. Uvg   D.hgu

33   Srq, pon, mlk, _____, gfe

A. Ijh   B. Jih   C. Jhi   D. Ihj

34   Kel, lfm, mgn, nho, oip, _____

A.jpo   B. Pjo   C. Pjq   D. None of these

35   E2hi,_____, ehi4, e5hi, eh6i

A. Eh3i   B. Ei3h   C. I2e3h   D. None of these

36   The students who apply to engineering colleges drop out because of lack of guidance.

A. True   B. False   C. Neutral   D. Not applicable

37   The students are not responsible for the decisions that they take to join engineering.

A. True   B. False   C. Neutral   D. Not applicable

38   There is a massive difference between what a college expects than a school from its students.

A. True   B. False   C. Neutral   D. Not applicable

39   The students must have clear picture of what they want to become after engineering right from 1st year of engineering.

A. True   B. False   C. Neutral   D. Not applicable

40   The students must not approach the library for referring to books which is prescribed in the syllabus.

A. True   B. False   C. Neutral   D. Not applicable

41   An engineer, in order to be performing well in their career must have only technical knowledge.

A. True   B. False   C. Neutral   D. Not applicable

42   Engineers are the reasons for which the commerce, trade and marketing has experienced drastic improvement.

A. True   B. False   C. Neutral   D. Not applicable

43   In order to be an effective engineer, one must pay closer and keen attention to minutest details.

     A. True   B. False   C. Neutral   D. Not applicable

44   Engineers do not require leadership as well as management skills.

     A. True   B. False   C. Neutral   D. Not applicable

45   Engineers know the value of time.

     A. True   B. False   C. Neutral   D. Not applicable

46   _____ mom is on the phone.

     A. You   B. Your   C. You're   D. Yours

47   _____ looking a lot better than you diD.

     A. You   B. Your   C. You're   D. Yours

48   If _____ in town, come by and see us.

     A. You   B. Your   C. You're   D. Yours

49   If you do it again _____ certain to get sent to the office.

     A. You   B. Your   C. You're   D. Yours

50   Was it _____ brother i saw last week?

     A. You   B. Your   C. You're   D. Yours

51   I hope that _____ happy in your new joB.

     A. You   B. Your   C. You're   D. Yours

52   I hope you get lots of presents on _____ birthday.

     A. You   B. Your   C. You're   D. Yours

53   _____ not going out looking like that.

     A. You   B. Your   C. You're   D. Yours

54   I'm coming over to _____ house to sort this out.

     A. You   B. Your   C. You're   D. Yours

55   Do you know where _____ going?

     A. You   B. Your   C. You're   D. Yours

56   The applause showed how deeply the presentation had _____ the audience.

     A. Affect   B. Effect   C. Affected   D. Effected

57   His attitude was _____ by his upbringing.

     A. Affect   B. Effect   C. Affected   D. Effected

58   No matter what he does, it will have no _____ on me.

     A. Affect   B. Effect   C. Affected   D. Effected

59   No matter what he does, it will not _____ me.

A. Affect   B. Effect   C. Affected   D. Effected

60   How was the team _____ by the loss of their coach?

A. Affect   B. Effect   C. Affected   D. Effected

61   What is the type of introduction called, when it is required to introduce yourself in quick time frame?

A. Self introduction B. Group introduction C. Elevator introduction   D. None of these

62   Choose the best option which suits the best for professional introduction.

A. Dress appropriately   B. Keep eye contact C. Be confident D. All of these

63   A non – formally prepared speech is calleD.

A. Extempore speaking B. Presentation C. Debate   D. None of these

64   Which of these element is not involved in the process of communication?

A. Pipe B. Sender   C. Message   D. Channel

65   Which of these is the third element of communication?

A. Sender   B. Reciver   C. Channel   D. Message

66   Which of these is the most important tool of communication?

A. Body language B. Gestures C. Language   D. Posture

67   Which of these must be avoided in any presentation?

A. Proper grammar   B. Complex words C. Short sentences   D. Clear voice

68   Which of these is not important in an oral presentation?

A. Words   B. Body language   C. Gestures   D. Audience size

69   Which of these is the best way to establish a proper rapport with audience?

A. Pointing finger   B. Making eye contact C. Waving hands   D.standing erect

70   In an oral presentation, the speaker should not _____

A. Panic   B. Pause   C. Making eye contact   D. Inspire

71   Which number among the following is divisible by 7?

A.77754   B. 7666   C. 77784   D. 5643

72   Which number among the following is divisible by 8?

A.762928   B. 220953   C. 19537455   D. None of these

73   Which number among the following is divisible by both 7 and 11?
A.4540074   B. 293076   C. 1793498   D. 5740702

74   Which of the following number is divisible by 63?

A.492815   B. 4107872   C. 5893407   D. 6221628

75 Which number is divisible by 18?

A.52794   B. 432181   C. 1725516   D. None of these

76 What is the unit digit in the product (365 x 659 x 771)?

A.1   B. 2   C. 4   D. 6

77 What is the unit digit in 7105

a. 1   B. 5   C. 7   D. 9

78 How many 3-digit numbers are completely divisible 6?

a. 140   B. 150   C. 151   D. 166

79 (112 + 122 + 132 + ... + 202) = ?

A. 398   B. 2485   C. 4232   D.1563

80 What is the unit digit in(795 - 358)?

A. 0   B.4   C. 6   D. 7

81 What will be remainder when 17200 is divided by 18 ?

a. 17   B. 16   C. 1   D. 2

82 When a number is divided by 13, the remainder is 11. When the same number is divided by 17, then remainder is 9. What is the number?
A. 339   B. 349   C. 369   D. None of these

83 In a division sum, the divisor is 10 times the quotient and 5 times the remainder. If the remainder is 46, what is the dividend?
A. 4236   B. 4036   C. 4336   D. 5336

84 On dividing a number by 357, we get 39 as remainder. On dividing the same number 17, what will be the remainder?
A. 0   B. 3   C. 5   D. 11

85 On dividing a number by 5, we get 3 as remainder. What will the remainder when the square of the number is divided by 5?
A. 0   B. 1   C. 2   D. 4

86 How many of the following numbers are divisible by 3 but not by 9 ?
2133, 2343, 3474, 4131, 5286, 5340, 6336, 7347, 8115, 9276
a. 5   B. 6   C. 7   D. None of these

87 The difference between the place value and the face value of 6 in the numeral 856973 is

a. 973   B. 5994   C. 5973   D. 435

88 The smallest 6 digit number exactly divisible by 111 is:

a. 111111   B. 11077   C. 100011   D. 2233109

89 The largest 5 digit number exactly divisible by 91 is:

a. 88899   B. 99918   C. 45361   D. 98978

90 What is the unit digit in (4137)754?

a. 1   B. 3   C. 7   D. 9

Read the following passages and answer the questions given below
(q91 – 100)

The greening of the aged

1. A visit to most homes for the aged is so depressing that second visits are uncommon. The men and

women we see there are listless, unresponsive, and often incapable of performing simple tasks. They appear unmotivated, uninterested, and turned away from others. Their debilitated physical and emotional condition is not a necessary consequence of old age. Rather, it is the inevitable result of being treated like a passive object in an institutional setting.

2. Recently, two young researchers from yale university, ellen langer and judith rodin, decided to see whether they could reverse the debilitated condition of residents in one of these old-age homes (1976). Their sample consisted of 91 residents, aged 65 to 90, all well enough to be walking about. The investigators reasoned that the crucial psychological process missing in such institutions was taking responsibility for one's own decisions. To be an actor in life's drama, we must act, decide, and be responsible for the consequences. To let others decide for us is to lose the main ingredient in self-esteem and competence.

91 How are the residents of old age homes described in paragraph 1?

A. Healthy   B. Sad   C. Uncommon   D. Weak, poor and troubled

92 According to the author, what is the reason for their poor condition?

A. Left out feel B. Uninterested C. Ill treated like a passive object   D. None of these

93 (par. 2) what was the researchers' hypothesis; i.e., what idea was their research based on?

A. Improving self esteem   B. Taking responsibility   C. Less competence   D. Change the condition of the poor

94 (par. 2) what is the main ingredient in self-esteem and confidence?

A. Act and decide   B. Decision making C. Debilated condition D.none of these

3. Accordingly, about half of the participants in the study were randomly assigned to a situation in which they received instructions that emphasized the need for them to take more responsibility for caring for themselves and for improving the quality of life in the home. They were then asked to choose a plant from among a box of them as a present – but they were told they had to care for it. In contrast, the second group of patients was given instructions that stressed the responsibility of the staff to provide good services for the residents. They were handed a plant as a present and informed that the nurses would water it for them.

4. The results of the enhanced sense of personal responsibility were dramatiC. On questionnaire ratings and behavioral measures, the experimental group ("i'll do it myself") showed significant improvement over the comparison group ("let george do it for you") on alertness, active participation, and general sense of well-being.

95 (par. 4) how did the researchers measure the results of the study?

A. Questionnaire ratings   B. Behavioral meausres   C.questionnaire   ratings   and   behavioral measures D. None of these

96 Which group improved more?

A. Experimental   B. Comparison C. Both D. None of these

97 In what areas did the better group show improvement?

A. Alertness B. Active participation C. Sense of well being   D. All of these

5. Eighteen months later, these positive results still persisted, as indicated by the nurses' higher ratings of the happiness, sociability, and vigor of the personally responsible group. But most startling of all, encouraging the residents to be responsible for themselves and their plants made them live longer! The overall death rate for the entire nursing home during an eighteen-month period prior to the experiment was 25 percent. Following the experiment, only 15 percent of the personally responsible residents died, compared to twice as many for the no-responsibility group.

6. In conclusion, psychological interventions of this kind not only improve mood and attitudes; they seem to affect the very process of life and death itself.

98 (par. 5) how were results 18 months later?

A. Results perished   B. No change C. Results remained   D. None of these

99 What was the most surprising finding of the study?

A. None changed   B. Residents became brave   C. Their plants made them live longer

D. None of these

100 Choose the correct conclusion from the options given below.

A. Residents can be changed   B. Psychological interventions help residents   C. People will not die
D. None of these

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ADICHUNCHANAGIRI UNIVERSITY

Second Semester BE Degree Examination July 2021
(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: ENGLISH II

Q P Code: 60011

Instructions: 1. Your answer should be specific to the questions asked**.**
  2. write the same question numbers as they appear in this question paper**.**
  3. Write Legibly

Question Paper Version – A

Answer all the questions   **100X1=100**

1 Employees desire professionals who do which of the following?

   A. Treat others respectfully only when they deserve it
   B. Speak their minds and talks over others
   C. Listen actively, honor commitments, and seek help when needed
   D. Discuss personal issues with coworkers

2 Your emails should be generally:

   A. Brief and to the point, but well-written   B. Long and vague
   C. Riddled with errors   D. Passage

3 When you get a personal phone call in a meeting, you:

   A. Ignore it and call them back later
   B. Excuse yourself and take it outside briefly
   C. Answer and have a loud conversation
   D. None of the above

4 Unlike social etiquette, office and bussiness etiquette are primarily based on

   A. Hierarchy and power   B. Personal relation
   C. Common sense   D. Option A and C

5 Your friend from college joins your company in a superior role to you. How should you interact with her in the office?

   A. Talk informally and don't take her seriously
   B. Show jealousy
   C. Break friendship ties and maintain only professional relationship
   D. Treat her like a superior in the office and as a friend outside

6 The key elements of presentation are:

   A. Presenter   B. The message and the medium
   C. Duration and time   D. All of the above

7 Topic identification is level one reqiuirement for a formal presentation

   A. Yes   B. No
   C. Maybe   D. Both a and c

8 How many pumps does a proffesional handshake require?

   A. 3   B. 4
   C. 5   D. Two and a grab of the forearm

PTO

9   A text is more efficient than an email when letting someone know you are running behind.

    A. True   B. False
    C. Maybe   D. None of the above

10   Is the most important thing you must do before you leave a party?

    A. Get business card from a new contact
    B. Ask for a doggie bag
    C. Say goodbye to the host
    D. Both A and C

11   What does the outdated term "turning the table" mean?

    A. Talk to the person on your left side during the first course, and rotate sides after each course
    B. Move the table to be closer to the dessert buffet
    C. Change seating throughout the course of a dinner party
    D. None

12   During an in-person conversation, what percent of your message is delievered through your spoken words?
    A. 7%   B.38%
    C. 55%   D. 43%

13   When is the most gracious time to respond to an invitation?

    A. Within 24 hours of receiving the invitation
    B. Within one week of receiving the invitation
    C. Anytime
    D. Both A and C

14   You can tell a lot about a person by their handshake. The double handshake, (where the person places their second hand on top of yours), is likely to be used by

    A. Someone who tends to dominate in the meetings
    B. Someone who is submissive
    C. Someone who trusts you and wants you to trust them
    D. None

15   Eye contact is an important part of communication, and a lack of it can imply deception. To avoid staring at somebody, how can you naturally strike a balance?

    A. When breaking eye contact, look to the left or to the right
    B. Look down at the floor every 30 seconds or so
    C. Look just past the person
    D. None

16   When you stand up to talk in front of a group of people, what can you do to exude confidence?

    A. Strike a wide stance
    B. Try to position a desk or table between you and your audience
    C. Clasp your hands in front of you
    D. Both A and B

17   Which of these signals suggest the person you are speaking to might not be telling the whole truth?
    A. They make steady eye contact
    B. They make frequent hand to face touches, including attempts to cover their mouth
    C. They answer you fairly promptly
    D. Both A and C

18   You need to ask some tough questions about your team's performance, and you notice that your team leader's leg is shaking. Does that suggest?

    A. He's feeling bored by the conversation
    B. He's feeling jittery about your line of questioning
    C. He is exuding confidence
    D. None

19 While addressing a senior member of your team about staffing changes, she suddenly crosses her arms. Do you take that to mean?
   A. She suddenly feels cold
   B. She's not sure what to do with her hands
   C. She is feeling defenseless, and is trying to shut out what is being proposed
   D. None

20 Using your hands while you talk can communicate a range of meanings, from enthusiasm and passion, to a lack of control. What would calm rounded hand gestures say to you?
   A. "i'm open and clear"
   B. "i think i'm in trouble"
   C. "i'm feeling over the moon"
   D. None

21 Listening means to respond to advice or request

   A. True   B. False   C. Maybe   D. None

22 Which of these is not a step in the listening process?

   A. To stop talking   B. Receiving
   C. Misinterpreting   D. Responding

23 Which of these is the first step in the listening process?

   A. Stop talking   B. Receiving
   C. Interpreting   D. Responding

24 Which of these is the third step in the listening process?

   A. Stop talking   B. Interpreting
   C. Responding   D. Receiving

25 _____ Is the last step of the listening process.

   A. Receiving   B. Interpreting
   C. Responding   D. Stop talking

26 Hearing means perceiving with ears.

   A. True   B. False   C. Maybe   D. None

27 Which of these is not a type of listening?

   A. Appreciative listening   B. Superficial listening
   C. Focused listening   D. Musical listening

28 Which of these types of listening lacks depth?

   A. Appreciative listening   B. Superficial listening
   C. Focused listening   D. Evaluative listening

29 In which of these types of listening, does the listener feel grateful?

   A. Superficial listening   B. Attentive listening
   C. Appreciative listening   D. Evaluative listening

30 Which of these types of listening is followed by skilled listeners?

   A. Focused listening   B. Evaluative listening
   C. Attentive listening   D. Empathetic listening

31 In which of these, the listener puts himself in place of the speaker?
   A. Focused listening   B. Evaluative listening
   C. Attentive listening   D. Empathetic listening

32 Body language can make or break a speech

   A. True   B. False   C. Maybe   D. None

33 Which of these is the study and classification of speech sounds?

   A. Gestures   B. Speech style
   C. Phonetics   D. Spoof

PTO

34   Which of these is not an element of the speaking technique?

A. Voice quality   B. Word stress
C. Appearance   D. Correct tones

35   Which of these means giving emphasis to a syllable

A. Voice quality   B. Word stress
C. Tone   D. Message

36   Which of these factors is not involved in the determination of correct tone?

A. Pitch   B. Dressing style
C. Quality   D. Strength

37   Which of these is not a type of tone?

A. Urgent tone   B. Serious tone
C. Restrained tone   D. Jumping tone

38   Which of these tones represent thoughtfulness?

A. Serious tone   B. Urgent tone
C. Happy tone   D. Outraged tone

39   Which of these tones is an unemotional tone?

A. Happy tone   B. Outraged tone
C. Restrained tone   D. Humorous tone

40   _____ Tone is used when speaker wants to bring about a good impression of her life.

A. Outraged   B. Reflective
C. Restrained   D. Urgent

41   On is used in speaking of things in motion.

A. True   B. False   C. Maybe   D. None

42   Fill in the blank. The dog sprang ____ him.

A. On   B. Upon   C. In   D. Over

43   Till is used for time.

A. True   B. False   C. Maybe   D. None

44   Which of these comes immediately after the noun?

A. Adverb phrase   B. Adjective phrase
C. Verb phrase   D. Pronoun phrase

45   Which of these statements is false?

A. The subject should usually follow the verb.
B. The object usually comes after the verb.
C. When there is an indirect object and a direct object, the indirect precedes the direct.
D. When the adjective is used attributively it comes before the noun which it qualifies.

46   Every statement must have a subject and a _____

A. Noun   B. Verb   C. Predicate   D. Phrase

47   Choose the correct statement.

A. Do not make friend with selfish people.
B. Do not make friendship with selfish people.
C. Do not make friends with selfish people.
D. Do not make friendly with selfish people.

48   Choose the correct statement.
A. She doesn't know the reason for his disappearance.
B. She doesn't know the reason of his disappearance.
C. She doesn't know the reason at his disappearance.
D. She doesn't know the reason with his disappearance

49   Some students are ____ at copying.

A. Adapt   B. Adept   C. Adopt   D. Edept

50   Father _____ me not to go out in the cold.

A. Advised   B. Advised   C. Advice   D. Advise

51   Fill in the blank. I advised her _____ drink it.

A. Don't   B. Not to   C. To not   D. To don't

52   Choose the correct statement.

A. He obtained passing marks.   B. He obtained pass marks.
C. He obtained passed marks.   D. He obtained passing mark.

53   Choose the correct statement.

A. Anil talks french well.   B. Anil chats french well.
C. Anil speaks french well.   D. Anil talk french well.

54   Choose the correct statement.
A. The ship was drowned.   B. The ship drowned.
C. The ship sank.   D. The ship had sank

55   Choose the correct statement

A. It is they who has to leave this place.
B. It is they who have to leave this place.
C. It is them who has to leave this place.
D. It is them who have to leave this place

56   Fill in the blank.
Offerings made upon the _____
A. Altar   B. Alter   C. Altar   D. Alter

57   Which of the following statements is incorrect?

A. A letter must be written in one single paragraph.
B. A letter must be complete in all respects.
C. A letter must be written in legible handwriting.
D. A letter must be properly punctuated.

58   Which of these is an example of courteous leave taking?

A. Yours sincerely   B. Yours sincerely,
C. Yours sincerely   D. Sincerely

59   Where should the signature of the writer be placed?

A. Above the courteous leave taking
B. Below the courteous leave taking
C. Next to the courteous leave taking
D. On the envelope

60   What is the information endorsed on the envelope?

A. Name   B. Address   C. Name and address   D. Name and date

61   In the following question, choose the correct code form.
If 'air' is called 'green', 'green' is called 'red', 'red' is called 'sea', 'sea' is called 'blue', 'blue' is called 'water' and 'water' is called 'pink', then what is the color of grass?

A. Green   B. Air
C. Red   D. Pink

62   In the following question, choose the correct code form.
According to new terminology, 'aries' means 'air', 'taurus' means 'light', 'libra' means 'water' and 'scorpio' means 'earth'. What would an organism breathe in?

A. Aries   B. Taurus   C. Libra   D. Scorpio

63   Choose the word which is least like the other words in the group.

A. Grenade   B. Katana
C. Shotgun   D. Rifle   **PTO**

64 Choose the word which is not similar to the other words in the group.
A. Peas   B. Cabbage   C. Spinach
D. Tomato

65 Solve the following question and choose the correct alternative from the following.
1, 2, 3, 4, and 5 are sitting in row but not necessarily in that order.
All of them are sitting in a row with their backs toward north.
3 is immediate right to 5 and 4 is immediate left to 1. Only 2 is between 1 and 5.
Which of the following are at the extreme ends?
A. 3, 4   B. 2, 5   C. 2, 1   D. 4, 5

66 In the following question, choose the correct code form.
If, in a language, 'one' is called 'two', 'two' is called 'three', 'three' is called 'four', 'four' is called 'five' and 'five' is called 'six'.
Then what is the square of number 2?

A. Three   B. Four   C. Five   D. Six

67 If 'dog' is called 'lion', 'lion' is called 'bison', 'bison' is called 'snake', 'snake' is called 'mongoose', 'mongoose' is called 'crocodile', then which one is reared as pet?

A. Lion   B. Bison   C. Snake
D. Mongoose

68 Choose the word which is least like the other words in the group.
A. Timor   B. India
C. Rhodes   D. Borneo

69 Choose the word which is not similar to the other words in the group.

A. Bonnet   B. Fender
C. Dashboard   D. Hubcap

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Five brothers are standing in a row facing north.
Tony is not adjacent to bony or mony. Sony is not adjacent to bony. Tony is adjacent to dony. Dony is at the middle in the row.
Then, which pair is at the extreme ends?
A. Tony, dony   B. Dony, bony
C. Sony, mony   D. Mony, tony

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There are seven monkeys sitting in a row - annie, bonnie, connie, donnie, earnie, fernie and genie.
Genie is to the right of donnie and to the left of bonnie.
Annie is on the right of connie.
Annie and donnie have one monkey between them.
Earnie and bonnie have two monkeys between them.
Donnie and fernie have two monkeys between them.
Who is on the immediate right of bonnie?

A. Donnie   B. Earnie   C. Genie   D. Fernie

72 If 'blue' means 'green', 'green' means 'yellow', 'yellow' means 'orange', 'orange' means 'black', 'black' means 'white', 'white' means 'red', 'red' means 'pink', 'pink' means 'brown', 'brown' means 'grey', then what is the color of human blood?
A. Black   B. Red   C. White   D. Orange

73 In the following question, choose the correct code form.
The number/word group in the question is to be codified according to the following letter codes:

Number	9	8	7	6	5	4	3	2	1	0
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13311728
A. OYYOOIRU   B. OYYOIROU
C. OYYORIOU   D. OYYOUIRO

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    The number/word group in the question is to be codified according to the following letter codes (use the same table mentioned above)

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08121993
A. DUROOQQY   B. DUOROQQY
C. DOUROYQY   D. DOUROYQQ

75 Choose the word which is least like the other words in the group.

A. Coconut   B. Flax
C. Castor   D. Mustard

76 Choose the word which is not similar to the other words in the group.

A. Joey   B. Filly
C. Gosling   D. Vixen

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    There are seven monkeys sitting in a row - annie, bonnie, connie, donnie, earnie, fernie and genie.
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    Annie and donnie have one monkey between them.
    Earnie and bonnie have two monkeys between them.
    Donnie and fernie have two monkeys between them.
    Who is exactly on the right of one that is exactly in the middle?

A. Donnie   B. Connie
C. Annie   D. Genie

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    There are seven monkeys sitting in a row - annie, bonnie, connie, donnie, earnie, fernie and genie.
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    Earnie and bonnie have two monkeys between them.
    Donnie and fernie have two monkeys between them.
    Who is on the second position from the left?
A. Annie   B. Bonnie
C. Connie   D. Donnie

79 Technical writing is same as general writing.

A. True   B. False   C. Maybe   D. None

80 Technical writing demands _____ use of language.
A. Figurative   B. Poetic   C. Factual   D. Dramatic

81 Which of these must be avoided in technical writing?

A. Facts   B. Grammar   C. Punctuation   D. Personal feelings

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83 Which of these is a technical word for slanting?

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        A. True   B. False   C. Maybe   D. None

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        A. Latin   B. English
        C. French   D. Italian
86   Trigonometry is a _____ word.

        A. French   B. German
        C. Indian   D. Greek

87   Which of these means bioscope?

        A. Math   B. Science   C. Cinema   D. Binoculars

88   Electricity is derived from _____ language
        A. Indian   B. Greek   C. French   D. Italian

89   Which of these reports are used in business?

        A. Formal technical reports   B. Informal reports
        C. Personal reports   D. Musical reports

90   Which of these forms is not used to write a non-formal report?

        A. Filling in a blank form   B. App
        C. Form of a letter   D. Memorandum

91   A non- formal report may be written by filling in a blank form.

        A. True   B. False   C. Maybe   D. None

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        A. Filling in a blank form   B. Form of a letter
        C. Form of a memorandum   D. Formal of a notice
93   A non- formal report written in the form of a letter is similar to a _____

        A. Friendly letter   B. Business letter
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94   A memorandum is almost like a letter.

        A. True   B. False   C. Maybe   D. None

95   Which of these forms does a formal report not take?

        A. Essay   B. Pamphlet   C. Friendly letter   D. Book

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        A. Feasibility   B. Periodic   C. Trouble   D. Progress

99   A summary is _____ of the original report.

        A. 2-5 percent   B. 5-10 percent   C. 12-15 percent   D. 15-20 percent
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                                        ****

ADICHUNCHANAGIRI UNIVERSITY

Second Semester BE Degree Examination July 2021
(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: ENGLISH II

Q P Code: 60011

Instructions: 1. Your answer should be specific to the questions asked**.**
                     2. write the same question numbers as they appear in this question paper**.**
                     3. Write Legibly

Question Paper Version – B

Answer all the questions   **100X1=100**

1   Fill in the blank. I advised her _____ drink it.

      A. Don't   B. Not to   C. To not   D. To don't

2   Choose the correct statement.

      A. He obtained passing marks.   B. He obtained pass marks.
      C. He obtained passed marks.   D. He obtained passing mark.

3   Choose the correct statement.

      A. Anil talks french well.   B. Anil chats french well.
      C. Anil speaks french well.   D. Anil talk french well.

4   Choose the correct statement.
      A. The ship was drowned.   B. The ship drowned.
      C. The ship sank.   D. The ship had sank

5   Choose the correct statement
      A. It is they who has to leave this place.
      B. It is they who have to leave this place.
      C. It is them who has to leave this place.
      D. It is them who have to leave this place

6   Fill in the blank.
      Offerings made upon the ____
      A. Altar   B. Alter   C. Altar   D. Alter

7   Which of the following statements is incorrect?

      A. A letter must be written in one single paragraph.
      B. A letter must be complete in all respects.
      C. A letter must be written in legible handwriting.
      D. A letter must be properly punctuated.

8   Which of these is an example of courteous leave taking?

      A. Yours sincerely   B. Yours sincerely,
      C. Yours sincerely   D. Sincerely

9   Where should the signature of the writer be placed?

      A. Above the courteous leave taking
      B. Below the courteous leave taking
      C. Next to the courteous leave taking
      D. On the envelope   **PTO**

10   What is the information endorsed on the envelope?

A. Name   B. Address   C. Name and address   D. Name and date

11   In the following question, choose the correct code form.
If 'air' is called 'green', 'green' is called 'red', 'red' is called 'sea', 'sea' is called 'blue', 'blue' is called 'water' and 'water' is called 'pink', then what is the color of grass?

A. Green   B. Air
C. Red   D. Pink

12   In the following question, choose the correct code form.
According to new terminology, 'aries' means 'air', 'taurus' means 'light', 'libra' means 'water' and 'scorpio' means 'earth'. What would an organism breathe in?

A. Aries   B. Taurus   C. Libra   D. Scorpio

13   Choose the word which is least like the other words in the group.

A. Grenade   B. Katana   C. Shotgun
D. Rifle

14   Choose the word which is not similar to the other words in the group.
A. Peas   B. Cabbage   C. Spinach
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50   An abstract is _____ of the original report.

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51   Employees desire professionals who do which of the following?

A. Treat others respectfully only when they deserve it
B. Speak their minds and talks over others
C. Listen actively, honour commitments, and seek help when needed
D. Discuss personal issues with co-workers

52   Your emails should be generally:

A. Brief and to the point, but well-written   B. Long and vague
C. Riddled with errors   D. Passage

53   When you get a personal phone call in a meeting, you:

A. Ignore it and call them back later
B. Excuse yourself and take it outside briefly
C. Answer and have a loud conversation
D. None of the above

54   Unlike social etiquette, office and business etiquette are primarily based on

A. Hierarchy and power   B. Personal relation
C. Common sense   D. Option A and C

55   Your friend from college joins your company in a superior role to you. How should you interact with her in the office?
A. Talk informally and don't take her seriously
B. Show jealousy
C. Break friendship ties and maintain only professional relationship
D. Treat her like a superior in the office and as a friend outside

56   The key elements of presentation are:

A. Presenter   B. The message and the medium
C. Duration and time   D. All of the above

57   Topic identification is level one requirement for a formal presentation

A. Yes   B. No
C. Maybe   D. Both A and C

58   How many pumps does a professional handshake require?

    A. 3   B. 4   C. 5   D. Two and a grab of the forearm

59   A text is more efficient than an email when letting someone know you are running behind.

    A. True   B. False
    C. Maybe   D. None of the above

60   Is the most important thing you must do before you leave a party?

    A. Get business card from a new contact
    B. Ask for a doggie bag
    C. Say goodbye to the host
    D. Both A and C

61   What does the outdated term "turning the table" mean?

    A. Talk to the person on your left side during the first course, and rotate   sides after each course
    B. Move the table to be closer to the dessert buffet
    C. Change seating throughout the course of a dinner party
    D. None

62   During an in-person conversation, what percent of your message is delievered through your spoken words?
    A. 7%   B.38%   C. 55%   D. 43%

63   When is the most gracious time to respond to an invitation?

    A. Within 24 hours of receiving the invitation
    B. Within one week of receiving the invitation
    C. Anytime
    D. Both A and C

64   You can tell a lot about a person by their handshake. The double handshake, (where the person places their second hand on top of yours), is likely to be used by

    A. Someone who tends to dominate in the meetings
    B. Someone who is submissive
    C. Someone who trusts you and wants you to trust them
    D. None

65   Eye contact is an important part of communication, and a lack of it can imply deception. To avoid staring at somebody, how can you naturally strike a balance?

    A. When breaking eye contact, look to the left or to the right
    B. Look down at the floor every 30 seconds or so
    C. Look just past the person
    D. None

66   When you stand up to talk in front of a group of people, what can you do to exude confidence?

    A. Strike a wide stance
    B. Try to position a desk or table between you and your audience
    C. Clasp your hands in front of you
    D. Both A and B

67   Which of these signals suggest the person you are speaking to might not be telling the whole truth?
    A. They make steady eye contact
    B. They make frequent hand to face touches, including attempts to cover their mouth
    C. They answer you fairly promptly
    D. Both A and C

68   You need to ask some tough questions about your team's performance, and you notice that your team leader's leg is shaking. Does that suggest?

    A. He's feeling bored by the conversation
    B. He's feeling jittery about your line of questioning
    C. He is exuding confidence
    D. None

69 While addressing a senior member of your team about staffing changes, she suddenly crosses her arms. Do you take that to mean?
    A. She suddenly feels cold
    B. She's not sure what to do with her hands
    C. She is feeling defenseless, and is trying to shut out what is being proposed
    D. None

70 Using your hands while you talk can communicate a range of meanings, from enthusiasm and passion, to a lack of control. What would calm rounded hand gestures say to you?
    A. "i'm open and clear"
    B. "i think i'm in trouble"
    C. "i'm feeling over the moon"
    D. None

71 Listening means to respond to advice or request

    A. True   B. False   C. Maybe   D. None

72 Which of these is not a step in the listening process?

    A. To stop talking   B. receiving
    C. Misinterpreting   D. Responding

73 Which of these is the first step in the listening process?

    A. Stop talking   B. Receiving
    C. Interpreting   D. Responding

74 Which of these is the third step in the listening process?

    A. Stop talking   B. Interpreting
    C. Responding   D. Receiving

75 _____ Is the last step of the listening process.

    A. Receiving   B. Interpreting
    C. Responding   D. Stop talking

76 Hearing means perceiving with ears.

    A. True   B. False   C. Maybe   D. None

77 Which of these is not a type of listening?
    A. Appreciative listening   B. Superficial listening
    C. Focused listening   D. Musical listening

78 Which of these types of listening lacks depth?

    A. Appreciative listening   B. Superficial listening
    C. Focused listening   D. Evaluative listening

79 In which of these types of listening, does the listener feel grateful?

    A. Superficial listening   B. Attentive listening
    C. Appreciative listening   D. Evaluative listening

80 Which of these types of listening is followed by skilled listeners?
    A. Focused listening   B. Evaluative listening
    C. Attentive listening   D. Empathetic listening

81 In which of these, the listener puts himself in place of the speaker?
    A. Focused listening   B. Evaluative listening
    C. Attentive listening   D. Empathetic listening

82 Body language can make or break a speech

    A. True   B. False   C. Maybe   D. None

83 Which of these is the study and classification of speech sounds?
    A. Gestures   B. Speech style
    C. Phonetics   D. Spoof

PTO

84   Which of these is not an element of the speaking technique?

A. Voice quality   B. Word stress
C. Appearance   D. Correct tones

85   Which of these means giving emphasis to a syllable

A. Voice quality   B. Word stress
C. Tone   D. Message

86   Which of these factors is not involved in the determination of correct tone?

A. Pitch   B. Dressing style
C. Quality   D. Strength

87   Which of these is not a type of tone?

A. Urgent tone   B. Serious tone   C. Restrained tone   D. Jumping tone

88   Which of these tones represent thoughtfulness?

A. Serious tone   B. Urgent tone   C. Happy tone   D. Outraged tone

89   Which of these tones is an unemotional tone?

A. Happy tone   B. Outraged tone
C. Restrained tone   D. Humorous tone

90   _____ Tone is used when speaker wants to bring about a good impression of her life.

A. Outraged   B. Reflective   C. Restrained   D. Urgent

91   On is used in speaking of things in motion.

A. True   B. False   C. Maybe   D. None

92   Fill in the blank. The dog sprang _____ him.

A. On   B. Upon   C. In   D. Over

93   Till is used for time.

A. True   B. False   C. Maybe   D. None

94   Which of these comes immediately after the noun?

A. Adverb phrase   B. Adjective phrase   C. Verb phrase   D. Pronoun phrase

95   Which of these statements is false?

A. The subject should usually follow the verb.
B. The object usually comes after the verb.
C. When there is an indirect object and a direct object, the indirect precedes the direct.
D. When the adjective is used attributively it comes before the noun which it qualifies.

96   Every statement must have a subject and a _____

A. Noun   B. Verb   C. Predicate   D. Phrase

97   Choose the correct statement.

A. Do not make friend with selfish people.
B. Do not make friendship with selfish people.
C. Do not make friends with selfish people.
D. Do not make friendly with selfish people.

98   Choose the correct statement.
A. She doesn't know the reason for his disappearance.
B. She doesn't know the reason of his disappearance.
C. She doesn't know the reason at his disappearance.
D. She doesn't know the reason with his disappearance

99   Some students are _____ at copying.

A. Adapt   B. Adept   C. Adopt   D. Edept

100   Father _____ me not to go out in the cold.

A. Advised   B. Advised   C. Advice   D. Advise

                              *****

18EGH28

Second Semester BE Degree Examination July 2021
(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: ENGLISH II

Q P Code: 60011

Instructions: 1. Your answer should be specific to the questions asked**.**
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Question Paper Version – C

Answer all the questions   **100X1=100**

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 A. Aries   B. Taurus   C. Libra   D. Scorpio

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 A. Grenade   B. Katana   C. Shotgun
 D. Rifle

4   Choose the word which is not similar to the other words in the group.

 A. Peas   B. Cabbage   C. Spinach
 D. Tomato

5   Solve the following question and choose the correct alternative from the following.
 1, 2, 3, 4, and 5 are sitting in row but not necessarily in that order.
 All of them are sitting in a row with their backs toward north.
 3 is immediate right to 5 and 4 is immediate left to 1. Only 2 is between 1 and 5.
 Which of the following are at the extreme ends?
 A. 3, 4   B. 2, 5   C. 2, 1   D. 4, 5

6   In the following question, choose the correct code form.
 If, in a language, 'one' is called 'two', 'two' is called 'three', 'three' is called 'four', 'four' is called 'five' and 'five' is called 'six'.
 Then what is the square of number 2?
 A. Three   B. Four   C. Five   D. Six

7   If 'dog' is called 'lion', 'lion' is called 'bison', 'bison' is called 'snake', 'snake' is called 'mongoose', 'mongoose' is called 'crocodile', then which one is reared as pet?
 A. Lion   B. Bison   C. Snake
 D. Mongoose

8   Choose the word which is least like the other words in the group.

 A. Timor   B. India
 C. Rhodes   D. Borneo

9   Choose the word which is not similar to the other words in the group.

 A. Bonnet   B. Fender
 C. Dashboard   D. Hubcap   **PTO**

10 Read the following information to answer the given question.
Five brothers are standing in a row facing north.
Tony is not adjacent to bony or mony. Sony is not adjacent to bony. Tony is adjacent to dony. Dony is at the middle in the row.
Then, which pair is at the extreme ends?
A. Tony, dony   B. Dony, bony
C. Sony, mony   D. Mony, tony

11 Read the following information to answer the given question.
There are seven monkeys sitting in a row - annie, bonnie, connie, donnie, earnie, fernie and genie.
Genie is to the right of donnie and to the left of bonnie.
Annie is on the right of connie.
Annie and donnie have one monkey between them.
Earnie and bonnie have two monkeys between them.
Donnie and fernie have two monkeys between them.
Who is on the immediate right of bonnie?

A. Donnie   B. Earnie   C. Genie   D. Fernie

12 If 'blue' means 'green', 'green' means 'yellow', 'yellow' means 'orange', 'orange' means 'black', 'black' means 'white', 'white' means 'red', 'red' means 'pink', 'pink' means 'brown', 'brown' means 'grey', then what is the color of human blood?
A. Black   B. Red   C. White   D. Orange

13 In the following question, choose the correct code form.
The number/word group in the question is to be codified according to the following letter codes:

Number	9	8	7	6	5	4	3	2	1	0
Letter	Q	U	I	C	K	L	Y	R	O	D

13311728
A. OYYOOIRU   B. OYYOIROU
C. OYYORIOU   D. OYYOUIRO

14 In the following question, choose the correct code form.
The number/word group in the question is to be codified according to the following letter codes (use the same table mentioned above)

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Letter	Q	U	I	C	K	L	Y	R	O	D

08121993
A. DUROOQQY   B. DUOROQQY
C. DOUROYQY   D. DOUROYQQ

15 Choose the word which is least like the other words in the group.
A. Coconut   B. Flax
C. Castor   D. Mustard

16 Choose the word which is not similar to the other words in the group.
A. Joey   B. Filly
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Donnie and fernie have two monkeys between them.
Who is exactly on the right of one that is exactly in the middle?
A. Donnie   B. Connie
C. Annie   D. Genie

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19 Technical writing is same as general writing.
    A. True   B. False   C. Maybe   D. None

20 Technical writing demands _____ use of language.
    A. Figurative   B. Poetic   C. Factual   D. Dramatic

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25 A scientist gets his special words from ____ language
    A. Latin   B. English
    C. French   D. Italian

26 Trigonometry is a ____ word.
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27 Which of these means bioscope?

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29 Which of these reports are used in business?

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    C. Maybe   D. None of the above

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   B. Ask for a doggie bag
   C. Say goodbye to the host
   D. Both A and C

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   A. Talk to the person on your left side during the first course, and rotate sides after each course
   B. Move the table to be closer to the dessert buffet
   C. Change seating throughout the course of a dinner party
   D. None

52   During an in-person conversation, what percent of your message is delievered through your spoken words?
   A. 7%   B.38%
   C. 55%   D. 43%

53   When is the most gracious time to respond to an invitation?

   A. Within 24 hours of receiving the invitation
   B. Within one week of receiving the invitation
   C. Anytime
   D. Both A and C

54   You can tell a lot about a person by their handshake. The double handshake, (where the person places their second hand on top of yours), is likely to be used by
   A. Someone who tends to dominate in the meetings
   B. Someone who is submissive
   C. Someone who trusts you and wants you to trust them
   D. None

55   Eye contact is an important part of communication, and a lack of it can imply deception. To avoid staring at somebody, how can you naturally strike a balance?
   A. When breaking eye contact, look to the left or to the right
   B. Look down at the floor every 30 seconds or so
   C. Look just past the person
   D. None

56   When you stand up to talk in front of a group of people, what can you do to exude confidence?

   A. Strike a wide stance
   B. Try to position a desk or table between you and your audience
   C. Clasp your hands in front of you
   D. Both a and b

57   Which of these signals suggest the person you are speaking to might not be telling the whole truth?
   A. They make steady eye contact
   B. They make frequent hand to face touches, including attempts to cover their mouth
   C. They answer you fairly promptly
   D. Both A and C

58   You need to ask some tough questions about your team's performance, and you notice that your team leader's leg is shaking. Does that suggest?
   A. He's feeling bored by the conversation
   B. He's feeling jittery about your line of questioning
   C. He is exuding confidence
   D. None

59   While addressing a senior member of your team about staffing changes, she suddenly crosses her arms. Do you take that to mean?

   A. She suddenly feels cold
   B. She's not sure what to do with her hands
   C. She is feeling defenseless, and is trying to shut out what is being proposed
   D. None

60   Using your hands while you talk can communicate a range of meanings, from enthusiasm and passion, to a lack of control. What would calm rounded hand gestures say to you?
   A. "i'm open and clear"
   B. "i think i'm in trouble"
   C. "i'm feeling over the moon"
   D. None

61 Listening means to respond to advice or request
A. True   B. False   C. Maybe   D. None

62 Which of these is not a step in the listening process?

A. To stop talking   B. receiving
C. Misinterpreting   D. Responding

63 Which of these is the first step in the listening process?

A. Stop talking   B. Receiving
C. Interpreting   D. Responding

64 Which of these is the third step in the listening process?
A. Stop talking   B. Interpreting
C. Responding   D. Receiving

65 _____ Is the last step of the listening process.
A. Receiving   B. Interpreting
C. Responding   D. Stop talking

66 Hearing means perceiving with ears.

A. True   B. False   C. Maybe   D. None

67 Which of these is not a type of listening?
A. Appreciative listening   B. Superficial listening
C. Focused listening   D. Musical listening

68 Which of these types of listening lacks depth?
A. Appreciative listening   B. Superficial listening
C. Focused listening   D. Evaluative listening

69 In which of these types of listening, does the listener feel grateful?

A. Superficial listening   B. Attentive listening
C. Appreciative listening   D. Evaluative listening

70 Which of these types of listening is followed by skilled listeners?

A. Focused listening   B. Evaluative listening
C. Attentive listening   D. Empathetic listening

71 In which of these, the listener puts himself in place of the speaker?
A. Focused listening   B. Evaluative listening
C. Attentive listening   D. Empathetic listening

72 Body language can make or break a speech
A. True   B. False   C. Maybe   D. None

73 Which of these is the study and classification of speech sounds?

A. Gestures   B. Speech style
C. Phonetics   D. Spoof

74 Which of these is not an element of the speaking technique?
A. Voice quality   B. Word stress
C. Appearance   D. Correct tones

75 Which of these means giving emphasis to a syllable

A. Voice quality   B. Word stress
C. Tone   D. Message

76 Which of these factors is not involved in the determination of correct tone?

A. Pitch   B. Dressing style
C. Quality   D. Strength

77 Which of these is not a type of tone?

A. Urgent tone   B. Serious tone
C. Restrained tone   D. Jumping tone

78 Which of these tones represent thoughtfulness?
A. Serious tone   B. Urgent tone
C. Happy tone   D. Outraged tone

79 Which of these tones is an unemotional tone?

A. Happy tone   B. Outraged tone
C. Restrained tone   D. Humorous tone

80 _____ Tone is used when speaker wants to bring about a good impression of her life.

A. Outraged   B. Reflective
C. Restrained   D. Urgent

81 On is used in speaking of things in motion.

A. True   B. False   C. Maybe   D. None

82 Fill in the blank. The dog sprang ____ him.
A. On   B. Upon   C. In   D. Over

83 Till is used for time.

A. True   B. False   C. Maybe   D. None

84 Which of these comes immediately after the noun?

A. Adverb phrase   B. Adjective phrase
C. Verb phrase   D. Pronoun phrase

85 Which of these statements is false?
A. The subject should usually follow the verb.
B. The object usually comes after the verb.
C. When there is an indirect object and a direct object, the indirect precedes the direct.
D. When the adjective is used attributively it comes before the noun which it qualifies.

86 Every statement must have a subject and a _____

A. Noun   B. Verb   C. Predicate   D. Phrase
87 Choose the correct statement.

A. Do not make friend with selfish people.
B. Do not make friendship with selfish people.
C. Do not make friends with selfish people.
D. Do not make friendly with selfish people.
88 Choose the correct statement.
A. She doesn't know the reason for his disappearance.
B. She doesn't know the reason of his disappearance.
C. She doesn't know the reason at his disappearance.
D. She doesn't know the reason with his disappearance

89 Some students are ____ at copying.
A. Adapt   B. Adept   C. Adopt   D. Edept
90 Father _____ me not to go out in the cold.
A. Advised   B. Advised   C. Advice   D. Advise

91 Fill in the blank.I advised her _____ drink it.
A. Don't   B. Not to   C. To not   D. To don't

92 Choose the correct statement.

A. He obtained passing marks.   B. He obtained pass marks.
C. He obtained passed marks.   D. He obtained passing mark.

93   Choose the correct statement.

      A. Anil talks french well.   B. Anil chats french well.
      C. Anil speaks french well.   D. Anil talk french well.

94   Choose the correct statement.

      A. The ship was drowned.   B. The ship drowned.
      C. The ship sank.   D. The ship had sank

95   Choose the correct statement

      A. It is they who has to leave this place.
      B. It is they who have to leave this place.
      C. It is them who has to leave this place.
      D. It is them who have to leave this place

96   Fill in the blank.
      Offerings made upon the ____
      A. Altar   B. Alter   C. Altar   D. Alter

97   Which of the following statements is incorrect?
      A. A letter must be written in one single paragraph.
      B. A letter must be complete in all respects.
      C. A letter must be written in legible handwriting.
      D. A letter must be properly punctuated.

98   Which of these is an example of courteous leave taking?
      A. Yours sincerely   B. Yours sincerely,
      C. Yours sincerely   D. Sincerely

99   Where should the signature of the writer be placed?

      A. Above the courteous leave taking
      B. Below the courteous leave taking
      C. Next to the courteous leave taking
      D. On the envelope

100   What is the information endorsed on the envelope?
      A. Name   B. Address   C. Name and address   D. Name and date

****

Second Semester BE Degree Examination July 2021
(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: ENGLISH II

Q P Code: 60011

Instructions: 1. Your answer should be specific to the questions asked.

2. write the same question numbers as they appear in this question paper.

3. Write Legibly

Question Paper Version – D

Answer all the questions   **100X1=100**

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Who is on the immediate right of bonnie?
A. Donnie   B. Earnie   C. Genie   D. Fernie

2   If 'blue' means 'green', 'green' means 'yellow', 'yellow' means 'orange', 'orange' means 'black',
'black' means 'white', 'white' means 'red', 'red' means 'pink', 'pink' means 'brown', 'brown' means
'grey', then what is the color of human blood?
A. Black   B. Red   C. White   D. Orange

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The number/word group in the question is to be codified according to the following letter codes:

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13311728
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08121993
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      C. She is feeling defenseless, and is trying to shut out what is being proposed
      D. None
50   Using your hands while you talk can communicate a range of meanings, from enthusiasm and passion, to a lack of control. What would calm rounded hand gestures say to you?
      A. "i'm open and clear"
      B. "i think i'm in trouble"
      C. "i'm feeling over the moon"
      D. None
51   Listening means to respond to advice or request

      A. True   B. False   C. Maybe   D. None
52   Which of these is not a step in the listening process?

      A. To stop talking   B.receiving
      C. Misinterpreting   D. Responding
53   Which of these is the first step in the listening process?

      A. Stop talking   B. Receiving
      C. Interpreting   D. Responding
54   Which of these is the third step in the listening process?

      A. Stop talking   B. Interpreting
      C. Responding   D. Receiving

55   _____ Is the last step of the listening process.

      A. Receiving   B. Interpreting
      C. Responding   D. Stop talking

56   Hearing means perceiving with ears.

      A. True   B. False   C. Maybe   D. None

57   Which of these is not a type of listening?
      A. Appreciative listening   B. Superficial listening
      C. Focused listening   D. Musical listening

58   Which of these types of listening lacks depth?
      A. Appreciative listening   B. Superficial listening
      C. Focused listening   D. Evaluative listening
59   In which of these types of listening, does the listener feel grateful?

      A. Superficial listening   B. Attentive listening
      C. Appreciative listening   D. Evaluative listening

60   Which of these types of listening is followed by skilled listeners?
      A. Focused listening   B. Evaluative listening
      C. Attentive listening   D. Empathetic listening
61   In which of these, the listener puts himself in place of the speaker?
      A. Focused listening   B. Evaluative listening
      C. Attentive listening   D. Empathetic listening
62   Body language can make or break a speech

      A. True   B. False   C. Maybe   D. None
63   Which of these is the study and classification of speech sounds?

      A. Gestures   B. Speech style
      C. Phonetics   D. Spoof

PTO

64 Which of these is not an element of the speaking technique?
    A. Voice quality   B. Word stress
    C. Appearance   D. Correct tones

65 Which of these means giving emphasis to a syllable
    A. Voice quality   B. Word stress
    C. Tone   D. Message

66 Which of these factors is not involved in the determination of correct tone?

    A. Pitch   B. Dressing style
    C. Quality   D. Strength

67 Which of these is not a type of tone?
    A. Urgent tone   B. Serious tone
    C. Restrained tone   D. Jumping tone

68 Which of these tones represent thoughtfulness?
    A. Serious tone   B. Urgent tone
    C. Happy tone   D. Outraged tone

69 Which of these tones is an unemotional tone?

    A. Happy tone   B. Outraged tone
    C. Restrained tone   D. Humorous tone

70 _____ Tone is used when speaker wants to bring about a good impression of her life.
    A. Outraged   B. Reflective
    C. Restrained   D. Urgent

71 On is used in speaking of things in motion.
    A. True   B. False   C. Maybe   D. None

72 Fill in the blank. The dog sprang ____ him.
    A. On   B. Upon   C. In   D. Over

73 Till is used for time.
    A. True   B. False   C. Maybe   D. None

74 Which of these comes immediately after the noun?
    A. Adverb phrase   B. Adjective phrase
    C. Verb phrase   D. Pronoun phrase

75 Which of these statements is false?

    A. The subject should usually follow the verb.
    B. The object usually comes after the verb.
    C. When there is an indirect object and a direct object, the indirect precedes the direct.
    D. When the adjective is used attributively it comes before the noun which it qualifies.

76 Every statement must have a subject and a _____

    A. Noun   B. Verb   C. Predicate   D. Phrase

77 Choose the correct statement.
    A. Do not make friend with selfish people.
    B. Do not make friendship with selfish people.
    C. Do not make friends with selfish people.
    D. Do not make friendly with selfish people.

78 Choose the correct statement.

    A. She doesn't know the reason for his disappearance.
    B. She doesn't know the reason of his disappearance.
    C. She doesn't know the reason at his disappearance.
    D. She doesn't know the reason with his disappearance

79 Some students are ____ at copying.

    A. Adapt   B. Adept   C. Adopt   D. Edept

80 Father _____ me not to go out in the cold.

    A. Advised   B. Advised   C. Advice   D. Advise

81   Fill in the blank. I advised her _____ drink it.
     A. Don't   B. Not to   C. To not   D. To don't

82   Choose the correct statement.

     A. He obtained passing marks.   B. He obtained pass marks.
     C. He obtained passed marks.   D. He obtained passing mark.

83   Choose the correct statement.

     A. Anil talks french well.   B. Anil chats french well.
     C. Anil speaks french well.   D. Anil talk french well.

84   Choose the correct statement.

     A. The ship was drowned.   B. The ship drowned.
     C. The ship sank.   D. The ship had sank

85   Choose the correct statement

     A. It is they who has to leave this place.
     B. It is they who have to leave this place.
     C. It is them who has to leave this place.
     D. It is them who have to leave this place

86   Fill in the blank.
     Offerings made upon the ____
     A. Altar   B. Alter   C. Altar   D. Alter

87   Which of the following statements is incorrect?

     A. A letter must be written in one single paragraph.
     B. A letter must be complete in all respects.
     C. A letter must be written in legible handwriting.
     D. A letter must be properly punctuated.

88   Which of these is an example of courteous leave taking?

     A. Yours sincerely   B. Yours sincerely,
     C. Yours sincerely   D. Sincerely

89   Where should the signature of the writer be placed?

     A. Above the courteous leave taking
     B. Below the courteous leave taking
     C. Next to the courteous leave taking
     D. On the envelope

90   What is the information endorsed on the envelope?

     A. Name   B. Address   C. Name and address   D. Name and date

91   In the following question, choose the correct code form.
     If 'air' is called 'green', 'green' is called 'red', 'red' is called 'sea', 'sea' is called 'blue', 'blue' is called 'water' and 'water' is called 'pink', then what is the color of grass?
     A. Green   B. Air
     C. Red   D. Pink

92   In the following question, choose the correct code form.
     According to new terminology, 'aries' means 'air', 'taurus' means 'light', 'libra' means 'water' and 'scorpio' means 'earth'. What would an organism breathe in?
     A. Aries   B. Taurus   C. Libra   D. Scorpio

93   Choose the word which is least like the other words in the group.

     A. Grenade   B. Katana   C. Shotgun
     D. Rifle

94   Choose the word which is not similar to the other words in the group.

     A. Peas   B. Cabbage   C. Spinach
     D. Tomato   **PTO**

95   Solve the following question and choose the correct alternative from the following.
      1, 2, 3, 4, and 5 are sitting in row but not necessarily in that order.
      All of them are sitting in a row with their backs toward north.
      3 is immediate right to 5 and 4 is immediate left to 1. Only 2 is between 1 and 5.
      Which of the following are at the extreme ends?
      A. 3, 4   B. 2, 5   C. 2, 1   D. 4, 5

96   In the following question, choose the correct code form.
      If, in a language, 'one' is called 'two', 'two' is called 'three', 'three' is called 'four', 'four' is called 'five'
      and 'five' is called 'six'.
      Then what is the square of number 2?
      A. Three   B. Four   C. Five   D. Six

97   If 'dog' is called 'lion', 'lion' is called 'bison', 'bison' is called 'snake', 'snake' is called 'mongoose',
      'mongoose' is called 'crocodile', then which one is reared as pet?

      A. Lion   B. Bison   C. Snake
      D. Mongoose

98   Choose the word which is least like the other words in the group.
      A. Timor   B. India
      C. Rhodes   D. Borneo

99   Choose the word which is not similar to the other words in the group.

      A. Bonnet   B. Fender
      C. Dashboard   D. Hubcap

100   Read the following information to answer the given question.
      Five brothers are standing in a row facing north.
      Tony is not adjacent to bony or mony. Sony is not adjacent to bony. Tony is adjacent to dony. Dony is at
      the middle in the row.
      Then, which pair is at the extreme ends?
      A. Tony, dony   B. Dony, bony
      C. Sony, mony   D. Mony, tony

                                            ****

First Semester BE Examination July 2021

(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: Engineering Mathematics - I

Q P Code: 60002

Instructions: 1**.** Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked**.**
4. write the same question numbers as they appear in this question paper**.**
5. Write Legibly

Module – 1

1	a	With the usual notation prove that $\tan\phi = r\left(\dfrac{d\theta}{dr}\right)$.	6 marks
	b	Find the angle between the curves $r = 2\sin\theta$, $r = \sin\theta + \cos\theta$	7 marks
	c	Find the radius of curvature of $x^3 + y^3 = 3axy$ at $\left(\dfrac{3a}{2}, \dfrac{3a}{2}\right)$	7 marks

OR

2	a	Show that the pair of curves $r = a(1 + \cos\theta)$ and $r = b(1 - \cos\theta)$ intersect each other orthogonally .	6 marks
	b	Find the Pedal equation for the curve $r^n = a^n(\cos n\theta)$	7 marks
	c	Show that $\dfrac{\rho}{r}$ is constant for the equiangular spiral $r = ae^{\theta\cot\alpha}$ where a and α are constants.	7 marks

Module – 2

3	a	Find the Macluarin's series for **tanx** upto the term x^4 .	6 marks
	b	Find $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$ if u= x + 3y^2 – z^3, v = 4x^{2}yz, w = 2z^2 – xy	7 marks
	c	Evaluate $\displaystyle\lim_{x\to 0}\left(\dfrac{a^x + b^x + c^x + d^x}{4}\right)^{\frac{1}{x}}$	7 marks

Or

4	a	Expand **log(secx)** upto the term x^4 using Macluarin's series.	6 marks
	b	Prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} + z\dfrac{\partial u}{\partial z} = 0$ if $u = f(\dfrac{x}{y}, \dfrac{y}{z}, \dfrac{z}{x})$.	7 marks
	c	Evaluate $\displaystyle\lim_{x\to 1}\left[\dfrac{x}{x-1} - \dfrac{1}{\log x}\right]$	7 marks

PTO

Module – 3

5 a Evaluate: $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dy dx$.   6 marks

b Evaluate $\int\limits_0^1 \int\limits_{y^2}^{y} xy\, dx\, dy$ on changing the order of integration.   7 marks

c Prove that $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ 7 marks

Or

6 a Evaluate $\int\limits_{-c}^{c} \int\limits_{-b}^{b} \int\limits_{-a}^{a} \left(x^2 + y^2 + z^2\right) dx\, dy\, dz$.   6 marks

b Find the area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.   7 marks

c Prove that $\int\limits_0^{\frac{\pi}{2}} \sqrt{\sin\theta}\, d\theta \int\limits_0^{\frac{\pi}{2}} \frac{d\theta}{\sqrt{\sin\theta}} = \pi$.   7 marks

Module – 4

7 a Solve: $(4xy + 3y^2 - x)dx + x(x + 2y)dy = 0$ 6 marks

b Find the orthogonal trajectories of the family of astroids $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$.   7 marks

c A body in air at $25^0 C$ cools from $100^0 C$ to $75^0 C$ in 1 minute.
Find the temperature of the body at the end of 3 minutes .   7 marks

Or

8 a **Solve:** $(x^2 + y^2 + x)dx + xydy = 0$ 6 marks

b Find the orthogonal trajectories of the family $y^2 = cx^3$ 7 marks

c Show that the equation $xp^2 + px - py + 1 - y = 0$ is Clairaut's equation,
hence obtain the general and singular solution .   7 marks

Module – 5

9 a Find the Rank of a Matrix A= $\begin{bmatrix} 2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ 6 marks

b Solve the following system of equation by Gauss elimination Method
$2x + y + 4z = 12$, $4x + 11y - z = 33$, $8x - 3y + 2z = 20$.   7 marks

c Diagonalize the matrix A = $\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$ and hence find A^6.   7 marks

Or

10 a Solve the following system of equation by Gauss Seidel Method
$5x + 2y + z = 12, x + 4y + 2z = 15, x + 2y + 5z = 20$. Carry out 3 iterations.   6 marks

b Using Rayleigh's power method find the largest Eigen value and Eigen vector,
given $\begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$ with initial Eigen vector $[1 \quad 0 \quad 0]^T$.   7 marks

c Test for consistency and solve
$5x + 3y + 7z = 4, 3x + 26y + 2z = 9, 7x + 2y + 10z = 5$.   7 marks

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First/Second Semester BE Examination July 2021

(CBCS Scheme)

Time: 3 Hours   Max Marks: 100 marks

Sub: Engineering Physics

Q P Code:60003/60013

Instructions: 1**.** Answer **five full** questions.
2. Choose one full question from each module
3. Your answer should be specific to the questions asked**.**
4. write the same question numbers as they appear in this question paper**.**
5. Write Legibly

Module – 1

1	a	What are Ultrasonic, subsonic, acoustic, transonic, supersonic and hypersonic waves.	6 marks
	b	What are damped oscillations? Give the theory and discuss the case of under damping	10 marks
	c	A free particle is executing SHM in a straight line. The maximum velocity it attains during any oscillation is 62.8 m/s. Find the frequency of oscillation, if its amplitude is 0.5 m.	4 marks

OR

2	a	Define simple harmonic motion. Give the characteristics of SHM.	6 marks
	b	Explain the construction and working function of Reddy shock tube. Mention any four applications of shock waves.	10 marks
	c	The distance between two pressure sensors in a shock tube is 150 mm. The time taken by a shock wave to travel this distance is 0.3 ms. If the velocity of sound under the same conditions is 340 m/s, find the Mach number of the shock wave.	4 marks

Module – 2

3	a	Explain the stress and strain. Explain the nature of elasticity with the help of stress-strain diagram	8 marks
	b	Derive an expression for the Young's modulus Y of the material of a single cantilever.	8 marks
	c	Calculate the force required to produce an extension of 1 mm in steel wire of length 2 m and diameter 1 mm. (Given: Young's modulus for steel $Y = 2.1 \times 10^{11}\,N/m^2$).	4 marks

Or

4	a	State and explain Hooke's law. Define Young's modulus, Bulk modulus and Rigidity modulus.	8 marks
	b	Derive the relation between Bulk modulus, Young's modulus and Poisson's ratio. Discuss the limiting values of Poisson's ratio.	8 marks
	c	Calculate the angular twist of a wire of length 0.3 m, and radius 0.2×10^{-3} m when a torque of 5×10^{-4} Nm is applied. Rigidity modulus of the material 8×10^{10} N/m.	4 marks

PTO

Module – 3

5 a Define the Unit cell and Primitive cell. Derive an expression for inter planar distance in terms of Miller indices — 10 marks

b Derive an expression for Numerical aperture in terms of R.I of core and cladding. — 6 marks

c The refractive indices of core and cladding are 1.50 and 1.48 respectively in an optical fiber. Find the numerical aperture and angle of acceptance. — 4 marks

Or

6 a Explain with neat diagram the different types of optical fiber with suitable diagram. — 6 marks

b Define APF. Calculate the atomic packing factor for SC BCC and FCC. — 10 marks

c Inter planar distance for a crystal is 2.5 Å and the glancing angle for third order spectrum was observed to be equal to $5^030`$. Find the wavelength of the X-rays used. — 4 marks

Module – 4

7 a Obtain an expression for time independent Schrodinger wave equation. — 8 marks

b Derive an expression for energy density under the condition of thermal equilibrium in terms of Einstein's co-efficient. — 8 marks

c Compute the first 3 permitted energy values for an electron in a box of width 0.4nm. — 4 marks

Or

8 a Explain the construction and working function of semiconductor diode laser with the help of energy level diagram — 8 marks

b Define wave function. Find the energy eigen values for an electron in one dimensional potential well of infinite height. — 8 marks

c The average output power of laser source emitting a laser beam of wavelength 0.6328 nm is 5 m W. Find the number of photons emitted per second by the laser source. — 4 marks

Module – 5

9 a Explain the failures of classical free electron theory. Discuss the merits of quantum free electron theory. — 8 marks

b What are dielectrics. Explain different types of dielectric Polarization. — 8 marks

c The Fermi level in Silver is 5.5 eV. Find the velocity of conduction electrons in Silver and also mean free path. Given relaxation time is $3.97x10^{-14 s}$. — 4 marks

Or

10 a Define electric polarization? Derive the expression for clasius Mossotti equation — 8 marks

b Define Fermi energy. Explain the variation of Fermi factor at T=0 K and T>0 K with diagram. — 8 marks

c Calculate the probability of an electron occupying an energy level 0.02 eV above the Fermi level at 200 K and 400 K in a metal — 4 marks

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Mrs. Aruna. B
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Number system:

there are four number systems of arithmetic that are used in the digital systems:

1) Decimal number system

2) Binary number system

3) Hexadecimal number system

4) Octal Number system.

Radix number for:

1) Binary is '2' = $(\quad)_2$

2) octal is '8' = $(\quad)_8$

3) decimal is '10' = $(\quad)_{10}$

4) Hexadecimal is '16' = $(\quad)_{16}$

Binary number system:

* Binary number system is a system that contain only two digits i.e 0's & 1's

* it is a base 2 number system.

* Binary digits are also called 'Bits'.

Octal number system.

* Octal system is a system that contain 8 digits i.e 0 to 7

* The number are 0, 1, 2, 3, 4, 5, 6, 7
* It is base 8 number system.

Decimal Number system.

→ There are the system that contain 10 digits
[0 - 9] i.e 0, 1, 2, 3 4 5 6 7 8 9

→ It is base 10 number system.

Hexadecimal Number system.

→ there are the system contain 16 digits [0-15]
i.e 0 to 9 and A to F with base 16.

→ numerals 10, 11, 12, 13, 14, 15 are represented
by A, B, C, D, E, F respectively Hence its
called alpha- numerals.

Note — Binary → base 2 = 0's & 1's
octal ⇒ base8 ⇒ 0 to 7
Decimal ⇒ base 10 ⇒ 0 to 9
Hexadecimal ⇒ base 16 ⇒ 0 to 15 (0 to 9,
A to F)

Relationship b/w Decimal, Binary octal & Hexa decimal number's.

⑮

Decimal 0 to 9 base 10	Binary 0's & 1's base 2 (8,4,2,1)	octal (0 to 7) base 8	Hexadecimal (0 to 15) base 16
			0
0	0000	0	1
1	0001	1	
		2	2
2	0010		3
	0011	3	
3		4	4
16	0100		
		5	5
5	0101		
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F
16	10000	20	10

Notes :

Bits : A single digit in the binary number is called bit.

Nibble : A group of 4 bits is called Nibble

Byte : A group of 8 bits is called bytes.

word : A group of 16 bits is called word

Double word : A group of 32 bits is called double word.

Conversion.

1) Binary to Decimal

* To convert Binary to Decimal number, by multipling each bit in the binary numbers by binary radix of 2 raised to the positions power.

* The result of each multiplication is expressed as a decimal number.

* each individual decimal number are added to obtain the decimal equivalent of the Binary numbers.

Problems

$(111110100)_2 \longrightarrow (\qquad)_{10}$

Solution.

$$\overset{2^8 \, 2^7 \, 2^6 \, 2^5 \, 2^4 \, 2^3 \, 2^2 \, 2^1 \, 2^0}{(1 \; 1 \; 1 \; 1 \; 1 \; 0 \; 1 \; 0 \; 0)_2} = (\quad)_{10}$$

MSB   LSB

$$= 2^8 \times 1 + 2^7 \times 1 + 2^6 \times 1 + 2^5 \times 1 + 2^4 \times 1 + 2^3 \times 0 + 2^2 \times 1$$

$$+ 2^1 \times 0 + 2^0 \times 0$$

$$= 256 + 128 + 64 + 32 + 16 + 4 + 0 + 0$$

$$= (500)_{10}$$

$$\boxed{(111110100)_2 = (500)_{10}}$$

with fraction.

In this case there is a decimal point.

$$(1 \; 1 \; 1 \; 0 \; 1 \; 0 \; 1 \; 1 \cdot 1 \; 0 \; 1 \; 1)_2 = (?)_{10}$$

$$\overset{2^7 \, 2^6 \, 2^5 \, 2^4 \, 2^3 \, 2^2 \, 2^1 \, 2^0 \quad 2^{-1} \, 2^{-2} \, 2^{-3} \, 2^{-4}}{(1 \; 1 \; 1 \; 0 \; 1 \; 0 \; 1 \; 1 \cdot 1 \; 0 \; 1 \; 1)_2} =$$

$$= (2^7 \times 1 + 2^6 \times 1 + 2^5 \times 1 + 2^4 \times 0 + 2^3 \times 1 + 2^2 \times 0 + 2^1 \times 1 + 2^0 \times 1) \cdot (2^{-1} \times 1 +$$

$$2^{-2} \times 0 + 2^{-3} \times 1 + 2^{-4} \times 1)$$

$$= (128 + 64 + 32 + 8 + 2 + 1) \cdot (0.5 + 0 + (0.125) + 0.0625)$$

$$= \underline{\underline{(235 \cdot 6875)_{10}}}$$

Decimal to Binary Conversions:

* Conversion of decimal to binary is done by repeated division of the decimal number by binary radix 2.

* The decimal number is repeatedly divided by 2. The remainder becomes the bits of the equivalent binary numbers.

* The re-mainder of the 1st division operatio -n yeilds the least significant bits (LSB) & the final number is the most significant bit (MSB).

Problems.

① $(500)_{10} \implies (?)_2$

$$
\begin{array}{r|l}
2 & 500 \\
\hline
2 & 250 - 0 \\
\hline
2 & 125 - 0 \\
\hline
2 & 62 - 1 \\
\hline
2 & 31 - 0 \\
\hline
2 & 15 - 1 \\
\hline
2 & 7 - 1 \\
\hline
2 & 3 - 1 \\
\hline
& 1 - 1 \\
\end{array}
$$

$\implies (111110100)_2$

with fraction:

② $(13.6875)_{10} \Rightarrow (?)_2$

```
2 | 13
2 |  6 - 1
2 |  3 - 0
   |  1 - 1
```
$\Rightarrow (1101)_2$

$\dfrac{0.6875 \times 2}{1.3750} \longrightarrow 1$

$\dfrac{0.375 \times 2}{0.750} \longrightarrow 0$

$\dfrac{0.750 \times 2}{1.5} \longrightarrow 1$

$\dfrac{0.5 \times 2}{1.0} \longrightarrow 1$

$\Rightarrow (1011)_2$

$(13.6875)_{10} \Rightarrow (1101.1011)_2$

Binary to Hexadecimal:

* Binary number are converted to hexadecimal numbers by dividing the binary number into group of 4 bits.

* To make 4 bits we can add 0's to leftmost.

problems.

① $(111111 0100)_2 \Rightarrow (?)_{16}$

$= 0001 | 1111 | 0100$

$= 1 \quad F \quad 4 \Rightarrow (1F4)_{16}$

with fractions.

② $(11010001.10011)_2 = (?)_{16}$

$= (1101 | 0001) . | 1001 | 1000 \Rightarrow (D1.98)_{16}$

$= \underset{D}{\quad} \underset{1}{\quad} . \underset{9}{\quad} \underset{8}{\quad}$

Hexadecimal to Binary.

* To convert from hexadecimal to binary num -bers requires H bits binary numbers with is to be inserted in place of each hexanumbers.

* each number numerals of the hexanumbers becomes a H bit binary numbers.

Problems:

① $(3DE2FA1)_{16} \Rightarrow (?)_2$

$$\Rightarrow \underset{\substack{3 \\ 0011}}{} \quad \underset{\substack{D \\ 1101}}{} \quad \underset{\substack{E \\ 1110}}{} \quad \underset{\substack{2 \\ 0010}}{} \quad \underset{\substack{F \\ 1111}}{} \quad \underset{\substack{A \& \\ 1010}}{} \quad \underset{\substack{1 \\ 0001}}{}$$

leading zero's neglected
= $(111101111000010111101000001)_2$

with fraction.

② $(FA245 \cdot 1A)_{16} = (?)_2$

$$\Rightarrow \underset{\substack{F \\ 1111}}{} \quad \underset{\substack{A \\ 1010}}{} \quad \underset{\substack{2 \\ 0010}}{} \quad \underset{\substack{H \\ 0100}}{} \quad \underset{\substack{5 \\ 0101}}{} \cdot \underset{\substack{1 \\ 0001}}{} \quad \underset{\substack{A \\ 1010}}{}$$

↓ Trailing zero (neglected.

Binary to octal conversion:

* we know that base for octal is 8 & base for binary is 2.

*) we require 3 bit to represent octal number. so that By grouping 8 digit. 3 bits of binary number and then converting each group bits to its octal equivalent.

Problems.

①

(110111 0011)₂ ⇒ (   )₈

⇒ 110 / 011 0

⇒ 001 | 101 | 11 0 | 011 |

add zero's to make 3 bit group.

1 5 6 3

⇒ (1 56 3)₈

with fraction.

② (111001101l·10)₂ ⇒ (   )₈

⇒ (001 | 110 | 011 | 011 · 100)₈ ← add zero. to make 3 bit group.

(1   6   3   3 · 4)₈

= (1633·4)₈

Octal to Binary Conversion.

* Conversion from octal to binary, it is the reverse process of Binary to octal.

⊕ each digit of the octal number is individu-ally converted to its binary equivalent to get its equivalent binary octal to binary conversion of numbers.

Problems:

① $(615)_8 \Rightarrow (\ ?\ )_{16}$

$$
\begin{array}{c|c|c}
6 & 1 & 5 \\
110 & 001 & 101
\end{array}
$$

$(6\ 1\ 5)_8 = (110\ 001\ 101)_2$.

with fraction.

① $(125.53)_8 \implies (\ ?\ )_2$

$$
\begin{array}{ccc|cc}
1 & 2 & 5 & 5 & 3 \\
\underline{001} & \underline{010} & \underline{101} & \underline{101} & \underline{011}
\end{array}
$$

neglected $= (001010101.101011)_2$

octal to Hexadecimal.

* convert octal number to its binary equivalent by converting each digit of octal to its equivalent 3-bit three bit binary number.

* convert binary numbers to its equivalent hexadecimal by grouping Four bit and convert it to its hexadecimal number.

Problems.

① $(615)_8 = (\ ?\ )_{16}$

$$
\Rightarrow \quad
\begin{array}{c|c|c}
6 & 1 & 5 \\
110 & 001 & 101
\end{array}
\rightarrow \text{octal}
\rightarrow \text{Binary}.
$$

$$
\Rightarrow \underline{0001}\ \underline{10\ 00}\underline{1\ 101}
$$

$= (1\ 8\ D)_{16} \longrightarrow \text{Hexadecimal}.$

with fractions.

② $(615.25)_8 = (?)_{16}$

$\Rightarrow \quad \overset{6}{\underline{110}}|\overset{1}{\underline{001}}.|\overset{5}{\underline{101}}|.|\overset{2}{\underline{101}}|\overset{5}{\underline{101}}|$

$\Rightarrow (110\ 001101.101101)_2$

$=\underline{000}||1\ 000|1101|.|1011|0100\ \underset{\sim}{\ }$ extrabit

add
extra $\Rightarrow (1 \quad 8 \quad D.54)_{26}$
bit

Hexadecimal to octal conversion:

*) convert hexanumber to its binary number.

* convert Binary number to its equivalent octal.

Problems

① $(BC66)_{16} \Rightarrow (?)_8$

$\Rightarrow \quad \overset{B}{\underset{(1011}{}}|\overset{C}{\underset{1100}{}}|\overset{G}{\underset{0110}{}}|\overset{6}{\underset{0110}{}})_2$

extra $=\underline{00}1|011|1.100|0|1|0|0110$
bit

$\Rightarrow (1\ 3\ 6146)_8$

② with fraction. $(BC66.AF)_{16} = (?)_8$

$= \overset{B}{\underset{1011}{}}|\overset{C}{\underset{1100}{}}|\overset{G}{\underset{0110}{}}|\overset{6}{\underset{0110}{}}|.|\overset{A}{\underset{1010}{}}|\overset{F}{\underset{1111}{}}$

$=001|011|110|0001|0\ 0110.101|0\ 11|110$

$\Rightarrow \underline{(136146.536)_8}$

Decimal to Hexadecimal:

⊛ Converting a decimal number into a hexadecimal involves repeated steps of dividing a decimal number by radix 16.

+ At each step the decimal remainder is replaced with its equivalent hexanumbers.

* The remainder of the first division step is LSB of the hexanumber and remainder of last division step in the MSB digit of hexanum -ber.

Problems.

① $(5386)_{10} \Rightarrow (?)_{16}$

$\Rightarrow$ 16 | 5386
16 | 336 — 10
16 | 21 — 0
1 — 5

$\Rightarrow (150\underline{10})$

$\Rightarrow (150A)_{16}$

with fraction.

② $(5386.345)_{10} \Rightarrow (?)_{16}$

16 | 5386
16 | 336 — 10
2 | 21 — 0
1 — 5

$\Rightarrow (150A)_{16}$

$\dfrac{0.345 \times 16}{\underline{2}.070} \longrightarrow 2$

$\dfrac{0.070 \times 16}{0\underline{5}.520} \longrightarrow 5$

$\dfrac{0.520 \times 16}{0\underline{8}.32} \longrightarrow 8$

$= (0.258)_{16}$

Finally.

$(150A.0258)_{16}$

Hexadecimal to Decimal.

* conversion from hexa to decimal is begin by converting each hexanumber into its decimal equivalent.

* each decimal number is multiplied by hexa radix 16 raised to its position power.

* individual decimal number are added to to obtain the decimal equivalent of the hexa -decimal number.

Problems.

① $(5DECA)_{16} \Rightarrow (?)_{10}$

$$= \overset{16^4}{5} \ \overset{16^3}{D} \ \overset{16^2}{E} \ \overset{16^1}{C} \ \overset{16^0}{A}$$

$$= 5 \times 16^4 + 13 \times 16^3 + 14 \times 16^2 + 12 \times 16^1 + 10 \times 16^0$$

$$= 5 \times 16^4 + 13 \times 16^3 + 14 \times 16^2 + 12 \times 16^1 + 10 \times 16^0$$

$$= 32680 + 53248 + 3584 + 192 + 10$$

$$= (384714)_{10}$$

with fraction.

② $(3E.4FC)_{16} \Rightarrow (?)_{10}$

$$= (3 \times 16^1 + 14 \times 16^0) \cdot (4 \times 16^{-1} + 15 \times 16^{-2} + 12 \times 16^{-3})$$

$$= (48 + 14) \cdot (0.25 + 0.0585 + 1.46 \times 10^{-3})$$

$$= (62.31005)_{10}$$

Note : $[A \rightarrow 10, \ B \rightarrow 11, \ C \rightarrow 12, \ D \rightarrow 13$
$E \rightarrow 14, \ F \rightarrow 15]$.

Binary compliment.

① One's complements
② Two's complements.

One's complements: The One's complement of a binary number is the binary number that results when we change all 1's to 0's and all 0's to 1's.

Eg: Find 1's complement of $(11010100)_2$.

Ans: $(00101011)_2$

Two's complements: Two's complement of a binary number is the binary number that results when we change all 1's to 0's and all 0's to 1's and add 1 to 1's complement.

(OR)

*) To Find Two's complements.

→ Find 1's complement for given number.

→ Add 1 to the 1's complement number.

Eg: Find 2's complement for $(11000100)_2$

$$
\Rightarrow \begin{array}{r} 00111011 \\ + \qquad 1 \\ \hline 00111100 \end{array}
$$

→ 1's complement

→ Add 1

→ 2's complement.

Binary Arithmatic Operation.

Arithmatic operation can be classified into two types.

   ① Addition

   ② Subtraction.

① Binary Addition.

Digital computer performs various arithmatic operation. The most baric operation is the addition of two binary number bits.

The simple addition consits of 4 possible combination.

i.e
$$0 + 0 = 0$$
$$0 + 1 = 1$$
$$1 + 0 = 1$$
$$1 + 1 = 1 \quad 0$$

half addition

$$\downarrow \text{carry} \quad \downarrow \text{sum}$$

* Addition of two bits is called Half addition.
* The addition of three bits is called full addition

i.e

A	B	C	Sum	Carry
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1

1	1	0	0	1
1	1	1	1	1

→ full additⁿ
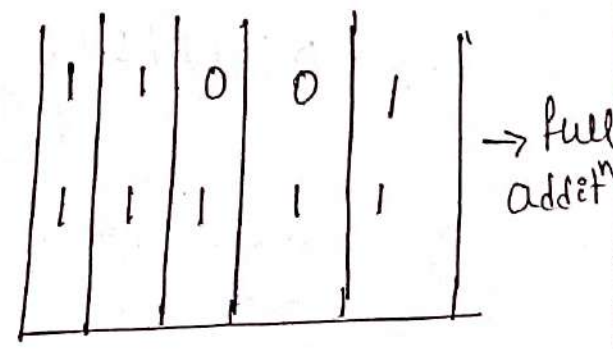
Binary Addition is of 2 types.

① unsigned number addition
② signed number addition.

unsigned number addition: unsigned binary numbers are positive numbers and thus do not require an arithmetic sign.

+ An m-bit unsigned number represents all numbers in the range 0 to 2^m-1.

* For example, the range of 8 bit unsigned binary numbers is from 0 to 255_{10} in decimal and from 00 to FF_{16} in hexadecimal.

problem.
① perform addition of $(11001100)_2$ & $(11011010)_2$

solution.
```
  1   1 1
  1 1 0 0 1 1 0 0
  1 1 0 1 1 0 1 0
  ───────────────
[1] 1 0 1 0 0 1 1 0
  ↓
```
carry.

② perform addition of $(110010)_2$ & $(111001)_2$

solution.
```
  1 1 0 0 1 0
  1 1 1 0 0 1
  ──────────
[1] 1 0 1 0 1 1
  ↓
```
carry

③ perform addition of $(001001)_2$ & $(101100)_2$ ⑱

soluⁿ

$$
\begin{array}{r}
0\ 0\ 1\ 0\ 0\ 1)_2 \\
1\ 0\ 1\ 1\ 0\ 0 \\
\hline
1\ 1\ 0\ 1\ 0\ 1 \\
\hline
\end{array}
$$

signed number addition. signed binary numbers are both positive and negative number. it requires +ve or -ve sign to represent signed number. The most significant bit of binary number is used to represent sign bit.

i.e if MSB is 0 then number is +ve binary number

if MSB is 1 then number is -ve binary number.

Problem. addition of
① perform $(+28)_{10}$ and $(+15)_{10}$.

soluⁿ $(28)_{10} \Rightarrow (11100)_2$ $(+15)_{10} \Rightarrow (1111)_2$

$$
\begin{array}{l}
2\lfloor 28 \\
2\lfloor 14-0 \\
2\lfloor 7-0 \\
2\lfloor 3-1 \\
\ \ \ \lfloor 1-1
\end{array}
\qquad
\begin{array}{l}
2\lfloor 15 \\
2\lfloor 7-1 \\
2\lfloor 3-1 \\
\ \ \ \lfloor 1-1
\end{array}
$$

$(+28)_{10} \Rightarrow \boxed{0}\ \boxed{0}\ 1\ 1\ 1\ 0\ 0$

$\dfrac{(+15)_{10} \Rightarrow \boxed{0}\ \boxed{0}\ \boxed{0}\ 1\ 1\ 1\ 1}{(+43)_{10}\qquad\quad \boxed{0}\ 1\ 0\ 1\ 0\ 1\ 1}$

Binary Subtraction.

Binary Subtraction is performed with the help of 1's complement and 2's complements.

a) Binary subtraction using 1's compliment:

In 1's complement subtraction, $-ve$ number is represented in the 1's complement form and add with $+ve$ number. to get the desired output result

i.e $\quad A - B.$

Steps:

1. Take 1's complement of B
2. result = A + 1's compliment of B.
3. If carry is generated, then add carry to result to get the actual result.

problems:

① Add $(+28)_{10}$ & $(-19)_{10}$ using 1's complement.

$(+28)_{10} = \boxed{0}\;1\;1\;1\;0\;0$

$(+19)_{10} = \boxed{0}\;1\;0\;0\;1\;1$

$(-19)_{10} \rightarrow \boxed{1}\;0\;1\;1\;0\;0$

$(+28)_0 = \boxed{0}\;1\;1\;1\;0\;0$

$(-19)_{10} \quad \boxed{1}\;0\;1\;1\;0\;0$

$(+\;9)_{10}\; [1]0\;0\;1\;0\;0\;0$

carry $\qquad +\!\!\rightarrow 1$

$0\;0\;1\;0\;0\;1$

```
2|28
2|14-0 ↑
2|7-0
2|3-1
  1-1
```

```
2|19
2|9-1 ↑
2|4-1
2|2-0
  1-0
```
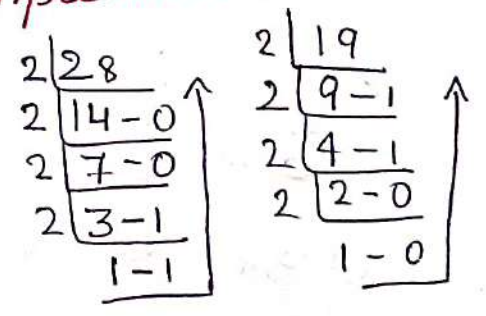
Verification.

$$(00\ 1001)_2 = 0 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$= 8 + 1 = 9 = (+9)_{10}$$

② Add $(15)_{10}$ and $(-28)_{10}$

$$(+15)_{10} = \boxed{0}\ 1\ 1\ 1\ 1\ 1$$

$$(+28)_{10} = \boxed{0}\ 1\ 1\ 1\ 0\ 0$$

$$= (-28)_{10} = \boxed{0}\ 1\ 1\ 1\ 0\ 0$$
$$\boxed{1}\ 0\ 0\ 0\ 1\ 1 \longrightarrow \text{I's complement.}$$

$$= (+15)_{10} \Rightarrow \boxed{0}\ \boxed{0}\ \overset{1}{1}\ \overset{1}{1}\ \overset{1}{1}\ \overset{1}{1}$$
$$(-28)_{10} \quad \boxed{1}\ 0\ 0\ 0\ 1\ 1$$
$$\overline{(-13)_{10} \quad \boxed{1}\ 1\ 0\ 0\ 1\ 0} \quad \text{actual result.}$$

Verification.

The result will be in the form of I's complement.

To verify take I's complement.

$$(+28)$$
$$(-13)_{10} \quad \boxed{1}\quad 1\ 0\ 0\ 1\ 0$$

$$(+13)_{10} = \boxed{0}\quad 0\ \overset{2^3}{1}\ \overset{2^2}{1}\ \overset{2^1}{0}\ \overset{2^0}{1}$$

$$= 1 \times 2^3 + 2^2 \times 1 + 2^0 \times 1$$

$$= 8 + 4 + 1$$

$$= (13)_{10}$$

③ Add $(-15)_{10}$ and $(-28)_{10}$.

$$(+15)_{10} = \boxed{0}\ 1\ 1\ 1\ 1$$

$$(+28)_{10} = \boxed{0}\ 1\ 1\ 1\ 0\ 0$$

$$(-15)_{10} \Rightarrow \boxed{0}\ 1\ 1\ 1\ 1 \qquad (-28)_{10} \Rightarrow \boxed{0}\ 1\ 1\ 1\ 0\ 0$$

$$\boxed{1}\ 0\ 0\ 0\ 0 \ -1\text{'s comple} \qquad\qquad \boxed{1}\ 0\ 0\ 0\ 1\ 1 \rightarrow 1\text{'s}$$
complim^l

$$\overset{1\ 1}{(-15)_{10} \Rightarrow \boxed{0}\boxed{1}\boxed{1}0\ 0\ 0\ 0}$$

$$(-28)_{10} \Rightarrow \boxed{0}\boxed{1}0\ 0\ 0\ 1\ 1$$

$$\overline{(-43)_{10}\ \boxed{1}\ 1\ 0\ 1\ 0\ 0\ 1\ 1}$$
carry $\downarrow$ $\rule{1cm}{0.4pt}$ $\rightarrow +1$

$$\overline{\boxed{1}\ 0\ 1\ 0\ 1\ 0\ 0}$$
$\uparrow$
sign bit
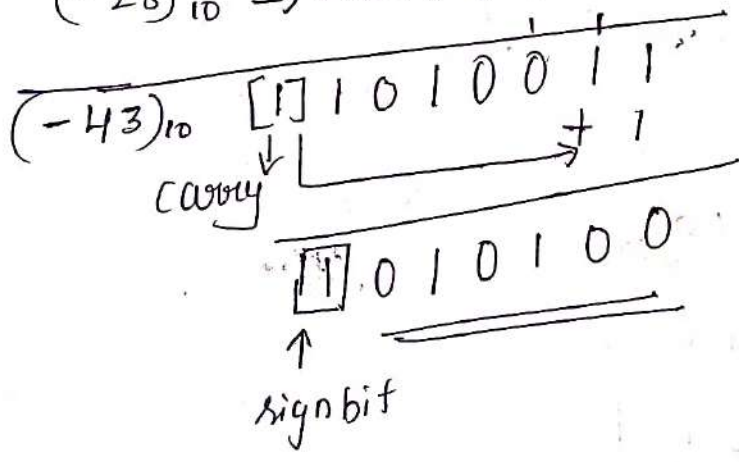
Verification:

—The result is in 1's complement. To verify take 1's complement for result.

$$(-43)_{10} = \boxed{1}\ 0\ 1\ 0\ 1\ 0\ 0$$
$$\qquad\qquad\quad 2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$$
$$\boxed{0}\ 1\ 0\ 1\ 0\ 1\ 1 \rightarrow 1\text{'s complement.}$$

$$\Rightarrow 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$\Rightarrow 32 + 8 + 2 + 1$$

$$= (+43)_{10}$$

(⑧ Binary subtraction using 2's complement.

In 2's complement subtraction take the 2's complement for -ve number and add with +ve number to get desired result.

i.e   A - B.

Steps.
1) take 2's complement of B.
2. Result = 2's complement of B + A.
3. If carry is generated, neglect the carry.

Problems.

① Add $(+28)_{10}$ and $(-19)_{10}$

$(+28)_{10} \Rightarrow$ [0] 1 1 1 0 0

$(+19)_{10} \Rightarrow$ [0] 1 0 0 1 1

2's complement for $(+19)_{10} \Rightarrow$ [1] 0 1 1 0 0 1's complement

　　　　　　　　　　　　　　　　　　　　　+ 1 add 1.
　　　　　　　　　　　　　　　　　　　　─────────
　　　　　　　　　　　　　　　　　　　　[1] 0 1 1 0 1

$(+28)_{10} \Rightarrow$ [0] 1 1 1 0 0

$(-19)_{10} \Rightarrow$ [1] 0 1 1 0 1
─────────────────────────────
$(+9)_{10}$ [1][0] 0 1 0 0 1

　　　　　　　↑　　↑
　　　　　carry Sign
　　　　　bit.   bit
　　　neglect the
　　　　carry.

Verification.

$$(+9)_{10} \Rightarrow \boxed{0}\ \overset{2^3}{0}\ \overset{2^2}{1}\ \overset{2^1}{0}\ \overset{2^0}{0}\ 0\ 1$$

$$= 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$= 8 + 1$$

$$(+9)_{10} = (+9)_{10}$$

② Add $(+15)_{10}$ and $(-28)_{10}$

$A = (+15)_{10} \Rightarrow \boxed{0}\ 1\ 1\ 1\ 1$

$B = (+28)_{10} \Rightarrow \boxed{0}\ 1\ 1\ 1\ 0\ 0$

2's complement of B ⟹

$$\boxed{0}\ 1\ 1\ 1\ 0\ 0$$
$$\boxed{1}\ 0\ 0\ 0\ 1\ 1 \qquad \text{1's complement.}$$
$$+\ 1 \qquad \text{add 1}$$
$$\overline{\boxed{1}\ 0\ 0\ 0\ 1\ 0\ 0} \rightarrow \text{2's complement of B.}$$

$(+15)_{10} \Rightarrow \boxed{0}\ \boxed{0}\ 1\ \overset{1}{1}\ \overset{1}{1}\ 1$

$(-28)_{10} \Rightarrow \boxed{1}\ 0\ 0\ 0\ 1\ 0\ 0$

$\overline{(-13)_{10}} \qquad \boxed{1}\ 1\ 0\ 0\ 1\ 1$

↑
Sign bit.

Verification: The result is in 2's complement. To verify take 2's complement for result.

$(-13)_{10} \Rightarrow \boxed{1}\ 1\ 0\ 0\ 1\ 1$

$\boxed{0}\ 0\ 1\ 1\ 0\ 0 \longrightarrow$ 1's complement

$+\ 1 \qquad$ add 1

$(+13)_{10} \Rightarrow \boxed{0}\ 0\ 1\ 1\ 0\ 1 \xrightarrow{} $ 2's complement.

$$(+13)_{10} \Rightarrow \boxed{0}\ \overset{2^4}{0}\ \overset{2^3}{1}\ \overset{2^2}{1}\ \overset{2^1}{0}\ \overset{2^0}{1}$$

$$(+13)_{10} = 0 \times 2^4 + 1 \times 2^2 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$= 8 + 4 + 1$$

$$(+13)_{10} = (+13)_{10}$$

③ Add $(-15)_{10}$ and $(-28)_{10}$

$$(+15)_{0} \Rightarrow \boxed{0}\ 1\ 1\ 1\ 1$$
$$(+28)_{10} \Rightarrow \boxed{0}\ 1\ 1\ 1\ 0\ 0$$

$$(-15)_{10} \Rightarrow \boxed{0}\ 1\ 1\ 1\ 1$$
$$\boxed{1}\ 0\ 0\ 0\ 0 \rightarrow \text{1's complement.}$$
$$+1 \rightarrow \text{add 1}$$
$$\boxed{1}\ 0\ 0\ 0\ 1 \rightarrow \text{2's complement.}$$

$$(-28)_{10} \Rightarrow \boxed{0}\ 1\ 1\ 1\ 0\ 0$$
$$\boxed{1}\ 0\ 0\ 0\ 1\ 1 \rightarrow \text{1's complement.}$$
$$+1 \rightarrow \text{add 1}$$
$$\boxed{1}\ 0\ 0\ 1\ 0\ 0$$

$$(\cancel{+15})_{16}\ (-15)_{10} \Rightarrow \boxed{0}\boxed{1}\boxed{1}\ 0\ 0\ 0\ 1$$
$$(-28)_{10} \Rightarrow \boxed{0}\boxed{1}\ 0\ 0\ 1\ 0\ 0$$
$$(-43)_{10}\ \boxed{1}\boxed{1}\ 0\ 1\ 0\ 1\ 0\ 1$$

carry ↑ ↑ sign bit

neglect the carry.

<u>Verification.</u> The result is in 2's complement. to verify take 2's complement.

$(-43)_{10} \rightarrow$

| 1 | 0 | 1 | 0 | 1 | 0 | 1 |

| 0 | 1 | 0 | 1 | 0 | 1 | 0 | $\rightarrow$ 1's complement.

$+1$ $\rightarrow$ Add 1

| 0 | 1 | 0 | 1 | 0 | 1 | 1 |

$(+43)_{10} = 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 2^0 \times 1$

$= 32 + 8 + 2 + 1$

$= (+43)_{10}$

Review of logic gate.

* The binary logic used in the digital systems assumes only two values either 'High' or 'Low'.

$\twoheadrightarrow$ These two logic states represents true for '1' & false for '0'.

* In binary logic. higher voltage represents binary 1 and the lower voltage represent a binary '0'.

i.e High = 1 (for +5v)

Low = 0 (for 0v)

Logic Operation.

The three basic logic operations are

① NOT / inventor

② AND

③ OR.

Basic logic gates.

They are three basic logic gates.

NOT gates :- The inversion (or complementary or negation) operator is written as a bar over its argument.

* The logic gate which perform inversion operation is called inverter or NOT gate.
* The inverter changes one logic level (1 or 0) to its opposite level (0 or 1).
* The bubble in the symbol indicates the inversion operation.

symbol of NOT gate.

$$A \;\longrightarrow\!\!\!\triangleright\!\!\circ\;\longrightarrow\; Y = \bar{A}$$
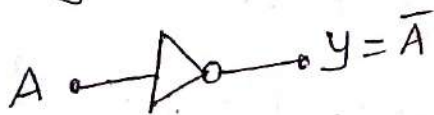
Truth table.

input	output
A	$Y = \bar{A}$
0	1
1	0

AND gates.

* AND gates performs logical multiplication. it is denoted by `x` or `.` i.e $A \times B$ or $A \cdot B$.

* AND gates output is high when both the inputs are high. its output is low when any one of the input is low.

* It may have two or more inputs, and a single output.

Symbol of AND gate.

A •———[ ]———• $y = A \cdot B$
B •———[ ]
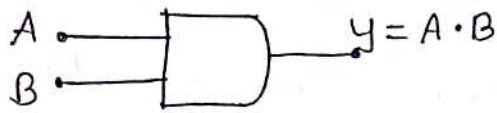
Truth table.

A	B	$Y = A \cdot B$
0	0	0
0	1	0
1	0	0
1	1	1

OR gate :

* OR gate performs logical Addition. it is denoted by '+' . i.e $A + B$.

* OR gate output is high when any one of the input is high and its output is low when both the inputs are low.

+ It may have two or more inputs and a single output.

Symbol of OR gate.

A •———⫧———• $y = A + B$
B •———⫧
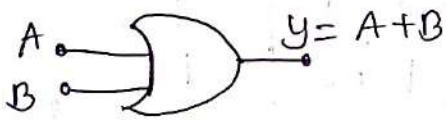
Truth table.

A	B	$Y = A + B$
0	0	0
0	1	1
1	0	1
1	1	1

Note: NAND and NOR gates are called universal gates.

NAND gate

Universal gates.

NAND and NOR gates are called as universal gates using these two gates it is possible to realize all the remaing gates such as AND, OR NOT, EX-NOR & EX-OR or any combination of these function.

NAND gate.

* NAND is a combination of NOT & AND gates

* NAND gate is a complemented output of AND gate.

* Its output is high when any one of the input is Low and its output is low when both the inputs are high.

symbol of NAND gate.

$Y = \overline{A \cdot B} \equiv$ AND + NOT = NAND
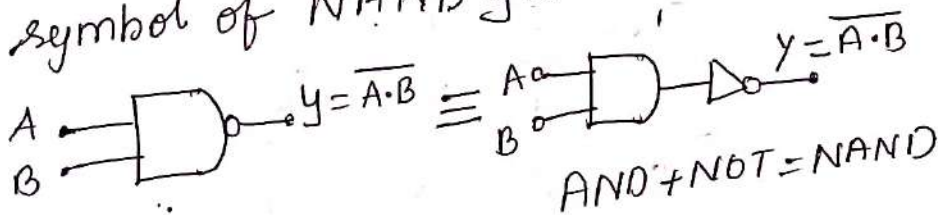
Truth table.

A	B	$Y = \overline{A \cdot B}$
0	0	1
0	1	1
1	0	1
1	1	0

NOR gate:

* NOR is a combination of NOT & OR gates.

* NOR gate is a complemented output of OR gate.

* Its output is high when both the inputs are low and its output is low when any one of the input is high.

Symbol of NOR gate.
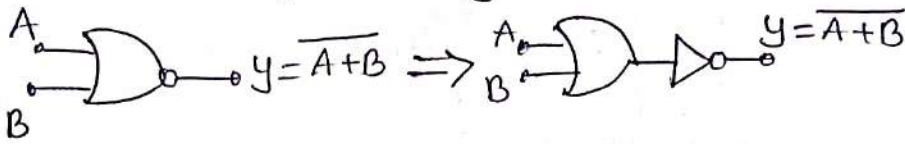
$y = \overline{A+B}$ $\Rightarrow$ $y = \overline{A+B}$

Truth table.

A	B	$y = \overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

other gates : available other gates are X-OR and X-NOR.

X-OR or Ex-OR gate.

* An XOR gate (Exclusive-OR gate). It has 2 or more inputs & one output.

* The output of XOR gate hie is high when any one of the input is high. if both the input is low & or if both the input is high then output is low.

symbol of XOR

$y = A\overline{B} + \overline{A}B$
or
$y = A \oplus B$
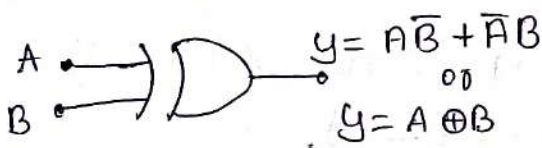
Truth table.

A	B	$y = A \oplus B$
0	0	0
0	1	1
1	0	1
1	1	0

X-NOR or Ex-NOR gate.

* its also called Exclusive-NOR gate, It has 2 or more inputs and only one output.

* It is logically equivalent to an Ex-OR gate followed by an inverter.

* The output of XNOR gate is high when both the inputs are high or both the inputs are low and output is low when any one of the input is high.

symbol of XNOR

$A \circ$)Do $\quad Y = \bar{A}\bar{B} + AB$

$B \circ$)Do $\quad$ or

$Y = \overline{A \oplus B}$

|||

$A \circ$)D-Do $\quad Y = \overline{A \oplus B}$

$B \circ$
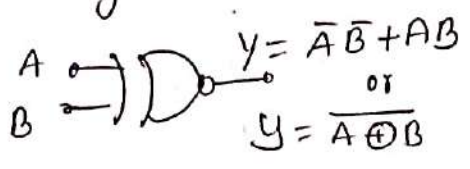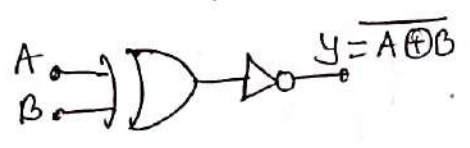
Truth table.

A	B	$Y = \overline{A \oplus B}$
0	0	1
0	1	0
1	0	0
1	1	1

Boolean Algebra

* Boolean algebra is a branch of mathematics that deals with operations on logical values with binary variables.

* Boolean variables are represented as binary numbers to represent high (1) = true and Low (0) = false.

* George. Boole in 1854 invented Boolean Algebra.

Rules of Boolean Algebra.

① Laws of Addition

$A + 0 = A$

$A + 1 = 1$

$A + A = A$

$A + \bar{A} = 1$

other rules.

*) $A + \bar{A}B = A + B$

* $(A+B)(A+C) = A + BC$

*) $A + AB = A$.

② Laws of multiplication.

$A \cdot 0 = 0$

$A \cdot 1 = A$

$A \cdot A = A$

$A \cdot \bar{A} = 0$

③ Laws of complementation.

$\bar{\bar{A}} = A$

Properties of Boolean Algebra:

① commutative property

   ① $A + B = B + A$

   ii $A \cdot B = B \cdot A$

② Associative property

   (i) $A + (B + C) = (A + B) + C$

   (ii) $(AB)C = A(BC)$

③ Distributive property.

   $\rightarrow A(B + C) = AB + AC$

④ complement property
(inverse)

      $A \cdot \overline{A} = 0$

      $A \cdot \overline{A} = 1$

⑤ Absorption property (Redendance)

   $\rightarrow A + AB = A$

   $\Rightarrow A(A + B) = A$

① commutative property - commutative property state that the order in which the variables are ORed (or) ANDed makes no difference.

Proof (1) $A + B = B + A$ ② $A \cdot B = B \cdot A$.

A	B	A+B	B+A	A·B	B·A
0	0	0	0	0	0
0	1	1	1	0	0
1	0	1	1	0	0
1	1	1	1	1	1

      LHS RHS LHS RHS
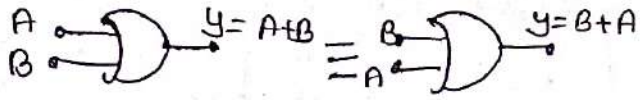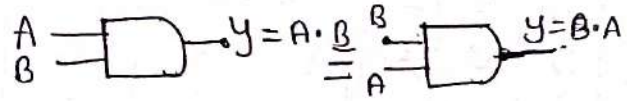
② Associative property.

(a) $A + (B+C) = (A+B) + C$

(b) $A \cdot (B \cdot C) = (A \cdot B) C$

Associative property state that it makes no changes in what order the variable are grouped for OR & AND operation.

Proof.

A	B	C	B+C	LHS $A+(B+C)$	$A+B$	RHS $(A+B)+C$
0	0	0	0	0	0	0
0	0	1	1	1	0	1
0	1	0	1	1	1	1
0	1	1	1	1	1	1
1	0	0	0	1	1	1
1	0	1	1	1	1	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1

LHS = RHS hence its proved

|||'y $A(BC) = (AB)C$ can be proved.

3) Distributive property:

$A(B+C) = AB + AC$

A	B	C	AB	AC	B+C	LHS $A(B+C)$	RHS $AB+AC$
0	0	0	0	0	0	0	0
0	0	1	0	0	1	0	0
0	1	0	0	0	1	0	0
0	1	1	0	0	1	0	0
1	0	0	0	0	0	0	0
1	0	1	0	1	1	1	1
1	1	0	1	0	1	1	1
1	1	1	1	1	1	1	1

∴ LHS = RHS

Hence its proved.

Demorgan's theorem:-

State and prove Demorgan's theorem..

Demorgan's 1st theorem

1) $\overline{AB} = \overline{A} + \overline{B}$

Statement: The complement of a product is equal to the sum of the complements.

proof.

A	B	AB	$\overline{A}$	$\overline{B}$	LHS $\overline{AB}$	RHS $\overline{A}+\overline{B}$
0	0	0	1	1	1	1
0	1	0	1	0	1	1
1	0	0	0	1	1	1
1	1	1	0	0	0	0

$\therefore$ LHS = RHS

Hence its proved.

Demorgan's 2nd theorem..

2) $\overline{A+B} = \overline{A} \cdot \overline{B}$

Statement: The complement of a sum is equal to the product of the complements.

Proof:

A	B	A+B	$\overline{A}$	$\overline{B}$	LHS $\overline{A+B}$	RHS $\overline{A}\cdot\overline{B}$
0	0	0	1	1	1	1
0	1	1	1	0	0	0
1	0	1	0	1	0	0
1	1	1	0	0	0	0

$\therefore$ LHS=RHS

Hence its proved.

Simplification and realization of Boolean expression using gates and NOND gates.

Problem ① Simplify the given boolean expression and realize using basic gates.

1) $(B + \bar{C})(\bar{B} + C) + \overline{(\bar{A} + B + \bar{C})}$

Let assume $Y = (B + \bar{C})(\bar{B} + C) + \overline{(\bar{A} + B + \bar{C})}$

$= (B + \bar{C})(\bar{B} + C) + \bar{\bar{A}} \cdot \bar{B} + \bar{\bar{C}}$ [∵ Demorgans theorem]

$= (B + \bar{C})(\bar{B} + C) + A \cdot \bar{B} \cdot C$ $[∵ \bar{\bar{A}} = 1]$

$= B\bar{B} + BC + \bar{C}\bar{B} + \bar{C}C + AB\bar{C}$ [∵ Distributive property]

$= BC + \bar{C}\bar{B} + A\bar{B}C$

$= \bar{B}\bar{C} + (B + A\bar{B})C$

$y = \bar{B}\bar{C} + (B + A)C$ $[∵ A + \bar{A}B = A + B]$

$$\boxed{y = \bar{B}\bar{C} + BC + AC}$$

To realize $y = \bar{B}\bar{C} + BC + AC$, we need 3-AND gate 1-OR gate.

$y = \bar{B}\bar{C} + BC + AC$
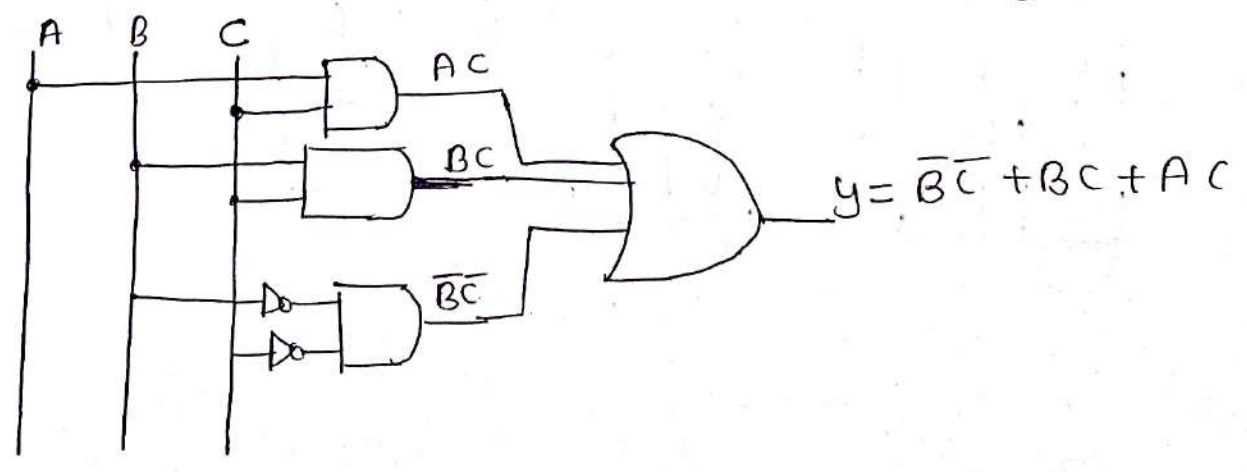
ii) $\overline{(\bar{A}+c)(B+\bar{D})} \neq \not{A}$

Simplification. Let assume $y = \overline{(\bar{A}+c)(B+\bar{D})}$

$$= \overline{(\bar{A}+c)} + \overline{(B+\bar{D})}$$

$$= \bar{\bar{A}} \cdot \bar{c} + \bar{B} \cdot \bar{\bar{D}}$$

$$= A \cdot \bar{c} + \bar{B} \cdot D$$

Realization.

$$y = A \cdot \bar{c} + \bar{B} \cdot D$$
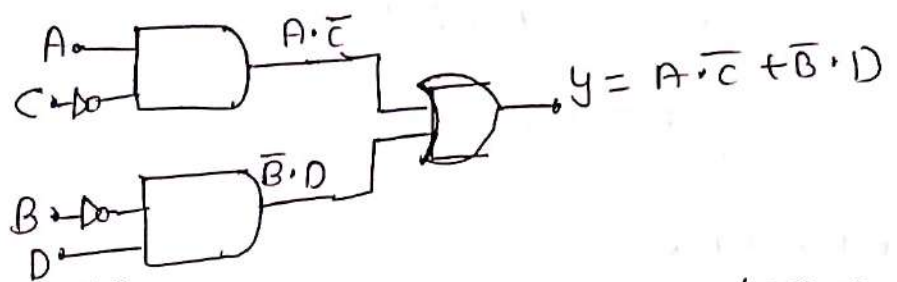
Note
for all the problem.
$\not{M_y}$ $\not{I_{\not{b}}}$ simplify the boolean expression and Realize

using basic gate ;

Simplification.

a) $A + AC$

Let take $y = A + AC$

$$y = A(1 + C)$$

$$\boxed{y = A.}$$
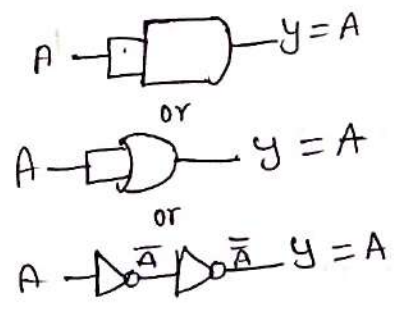
b) $A + \bar{A}B =$

Let take $y = A + \bar{A}B$

$$= (A + \bar{A})(A + B)$$

$$= AA + AB + \bar{A}A + \bar{A}B$$

$$= A(A + B) + \bar{A}(A + B)$$

$$= (A + \bar{A})(A + B)$$

$$= \underline{\underline{A + B}}$$

Realization

$$A \quad \text{—} \quad y = A$$

or

$$A \quad \text{—} \quad y = A$$

or

$$A \quad \overline{A} \quad \bar{\bar{A}} \quad y = A$$

Realization.

$$y = A + B.$$
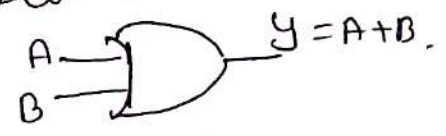
c) $A + \overline{A}B + ABC -$

lets take

$$y = A(1 + B\overline{C}) + \overline{A}B$$
$$= A + \overline{A}B$$
$$= (A + \overline{A})(A + B)$$
$$= AA + \overline{A}A + AB + \overline{A}B$$
$$= A(A + B) + \overline{A}(A + B)$$
$$= (A + B)(A + \overline{A})$$
$$= \underline{\underline{A + B}}.$$

d) $A + \overline{A}B + ABC + A\overline{C} =$

$$y = A + B + A(BC + \overline{C}) \qquad [\because A + \overline{A}B = A + B]$$
$$= A + B + A(B + \overline{C})(C + \overline{C}) \qquad [C + \overline{C} = 1]$$
$$= A + B + A(B + \overline{C})$$
$$= A + B + AB + A\overline{C}$$
$$= A(1 + B + \overline{C}) + B$$

$$\boxed{y = A + B}$$

e) $\overline{A}C + \overline{A}\overline{C}$

$$y = \overline{A}C + \overline{A}\overline{C}$$
$$= \overline{A}C + \overline{A} + \overline{C}$$
$$= \overline{A}(C + 1) + \overline{C}$$
$$= \underline{\underline{\overline{A} + \overline{C}}}$$

$\overline{A}$, $\overline{C}$ gates with $y = \overline{A} + \overline{C}$

$\overline{A}$, $\overline{C}$ gates with $y = \overline{A} + \overline{C}$
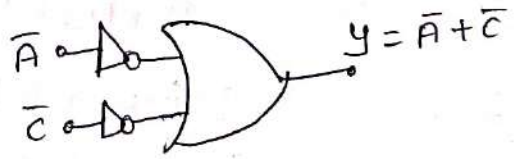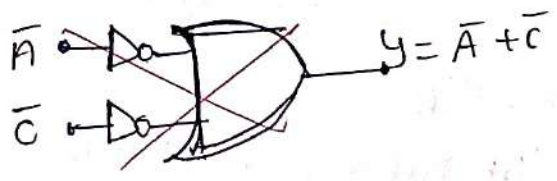
h. $\overline{AB + \overline{A}B + A} = \overline{AB} \cdot \overline{\overline{A}B} \cdot \overline{A}$

$= (\overline{A} + \overline{B}) \, \overline{AB} \, \overline{A}$

$= \overline{A}\,\overline{AB}\,\overline{A} + \overline{B}\,\overline{A}\,B\,\overline{A}$

$= \overline{A} \cdot A \; \overline{B}A + \overline{B}\,B \; A\,\overline{A}$

$= 0 + 0$

$= \underline{\underline{0}}$

i) $y = AB + \overline{A} + \overline{AB}$

$y = AB + \overline{A} + \overline{A} + \overline{B}$

$= AB + \overline{A} + \overline{B} \qquad [\because \; \overline{A} + \overline{A} = \overline{A}]$

$= AB + \overline{AB} \qquad [\because \; \overline{A} + \overline{B} = \overline{AB}]$

$= \underline{\underline{1}} \qquad\qquad [A + \overline{A} = 1]$

j) $\overline{(\overline{A} + C)(B + \overline{D})}$

$y = \overline{(\overline{A} + C)} + \overline{(B + \overline{D})}$

$= (\overline{\overline{A}} \cdot \overline{C}) + (\overline{B} \cdot \overline{\overline{D}})$

$= \underline{\underline{A \cdot \overline{C} + \overline{B} \cdot D}}$

<u>H.W.</u>

*Simplify the following boolean equation and realize use basic gate.

i. $A\overline{B} + A(B + C) + B(B + C)$

ii. $[A\overline{B}(C + BD) + \overline{A}\,\overline{B}]C$

iii. $\overline{A}BC + A\overline{B}\,\overline{C} + \overline{A}\,\overline{B}\,\overline{C} + A\overline{B}C + ABC$

Realize all gates by using NAND gate.

1) NOT gate using NAND

$$Y = \overline{A \cdot A} = \overline{A}$$
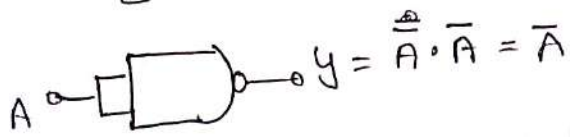
2) AND gate using NAND

$$Y = AB$$
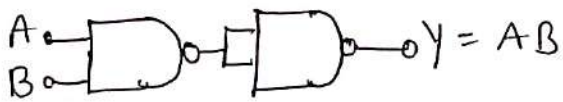
3) OR gate using NAND

$$Y = \overline{\overline{A}\,\overline{B}} = A + B$$
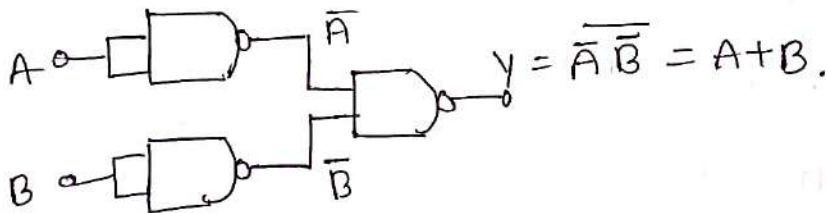
4) NOR gate using NAND

$$Y = \overline{A + B}$$
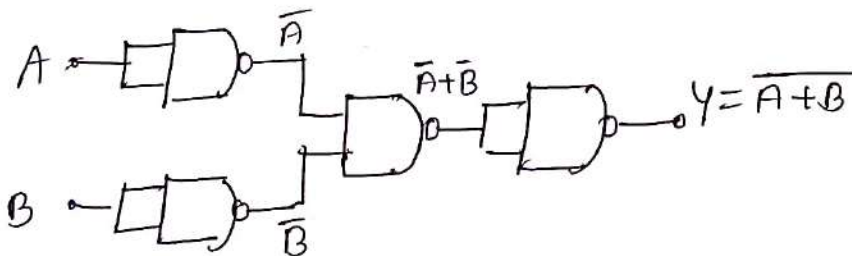
5) XOR gate using NAND
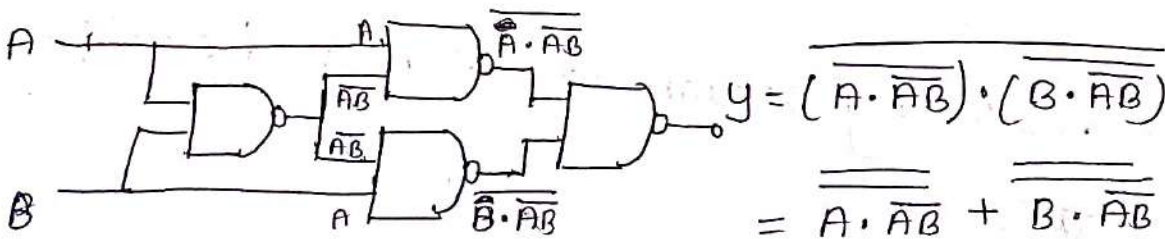
$$Y = \overline{(A \cdot \overline{AB}) \cdot (B \cdot \overline{AB})}$$

$$= \overline{\overline{A \cdot \overline{AB}}} + \overline{\overline{B \cdot \overline{AB}}}$$

$$= A \cdot \overline{AB} + B \cdot \overline{AB}$$

$$= A(\overline{A} + \overline{B}) + B(\overline{A} + \overline{B})$$

$$= A\overline{A} + A\overline{B} + B\overline{A} + B\overline{B}$$

$$= A\overline{B} + B\overline{A}$$

$$\underline{\underline{Y = A \oplus B}}$$

X-NOR using NAND gate.

$$y = \overline{\overline{(A \cdot \overline{AB})} \cdot \overline{(B \cdot \overline{AB})}}$$

$$= \left(\overline{A} + \overline{\overline{AB}}\right)\left(\overline{B} + \overline{\overline{AB}}\right)$$

$$= (\overline{A} + AB)(\overline{B} + AB)$$

$$= \overline{A}\,\overline{B} + \overline{A}AB + AB\overline{B} + AB \cdot AB$$

$$= \overline{A}\,\overline{B} + AB$$

$$= \overline{A \oplus B}$$
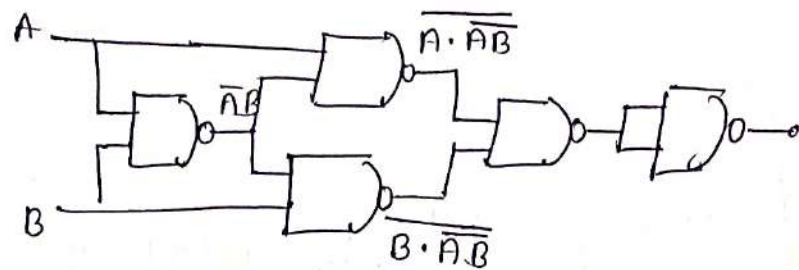
Problem

Write boolean expression and truth table for following logical circuit.
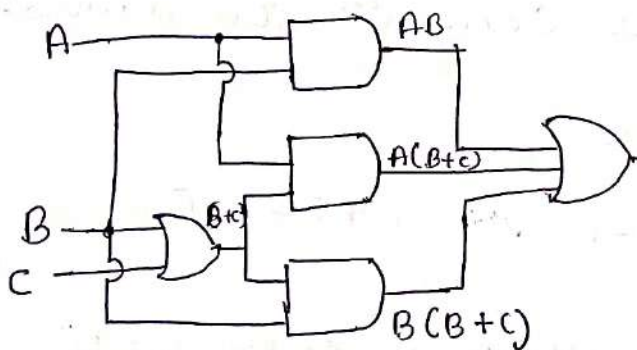
$$y = AB + A(B+c) + B(B+c)$$

the logical Boolean expression for above logic-al circuit is,

$$y = AB + A(B + c) + B(B + c)$$

$$= AB + AB + AC + BB + BC$$

$$= AB + AC + BC + B$$

$$= (A + C + 1)B + AC$$

$$= B + AC$$

$$y = Ac + B$$

Truth table.

A	B	C	AC	AC+B
0	0	0	0	0
0	0	1	0	0
0	1	0	0	1
0	1	1	0	1
1	0	0	0	0
1	0	1	1	1
1	1	0	0	1
1	1	1	1	1
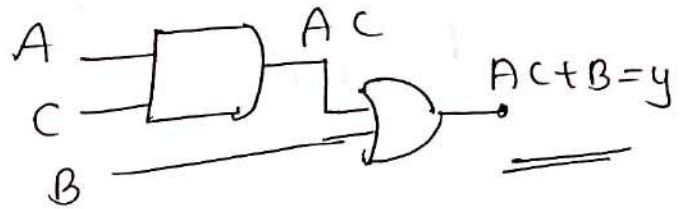
Adders.

The basic building blocks of the arithmetic arithmetic unit in digital computer are adders.

The possible operations are

i) $0+0=0$ ii) $0+1=1$ iii) $1+0=1$ iv) $1+1=1\ 0$

The first three operations produce only _sum_ and last operation has two bits. The LSB is called as a sum bit & The MSB bit is called as a carry bit.

Half Adders. [HA]

A combinational circuit which perform the arith-matic addition of two binary digits is called a half-adder.

* It consists of two binary inputs and two outputs Sum & carry.

Block diagram of Half adder.
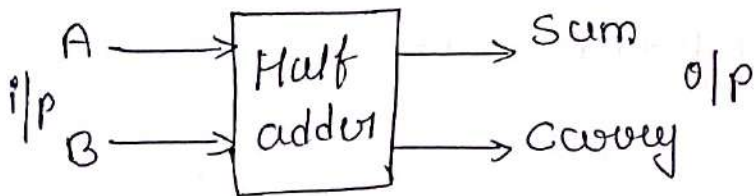
Truth table of Half adder

A	B	Sum	carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Boolean expression.

$$Sum = A\bar{B} + \bar{A}B \quad \text{or} \quad A \oplus B$$

$$Carry = AB$$

Implementation of Half adder using X-OR gate.

logic Diagram.

$$Sum = A \oplus B$$

$$carry = AB$$
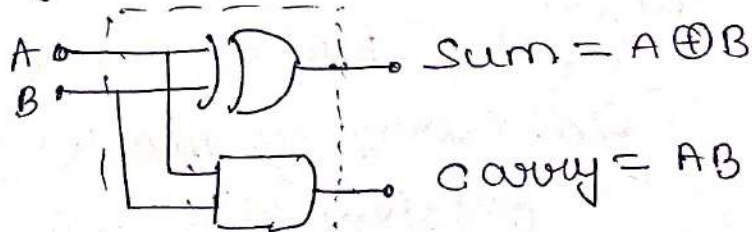
H.A using EK-OR gate.

Implementation of half adder using basic gate. 4L

$$\bar{A}B + A\bar{B} = Sum$$

$$Carry = AB.$$
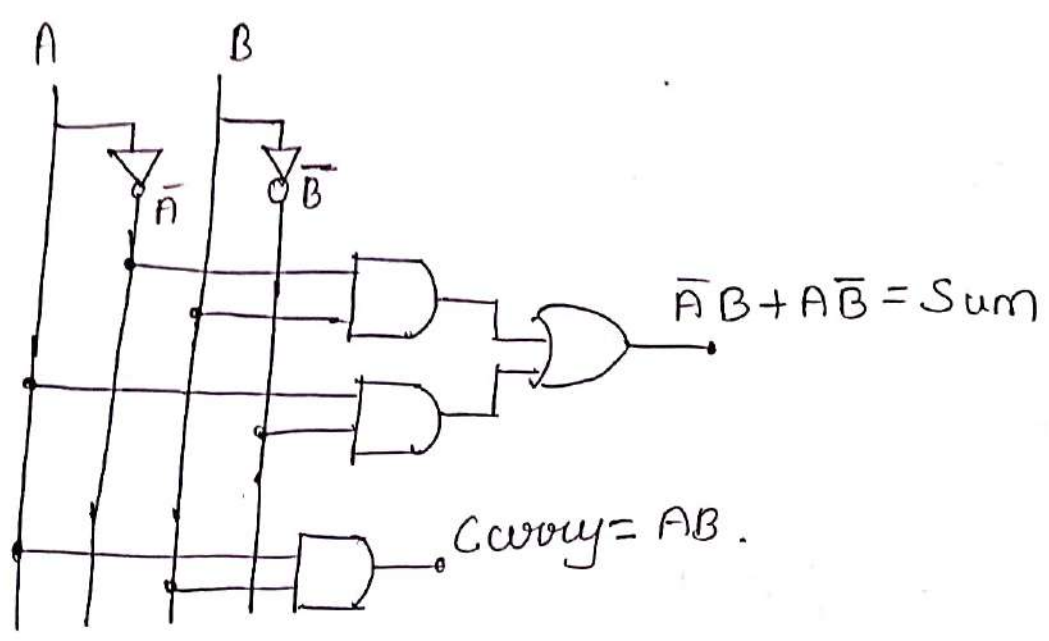
Limitation of half adder

In half adder we can't add the carry of the previous digital data, these kind of addition requires 3 bit hence full adder is required.

Full adder.

A combinational circuit which performs the arithmatic addition of three binary input. [i.e two significant bits & a previous carry].

→ it consists of three inputs and two output.

Block diagram of full adder.
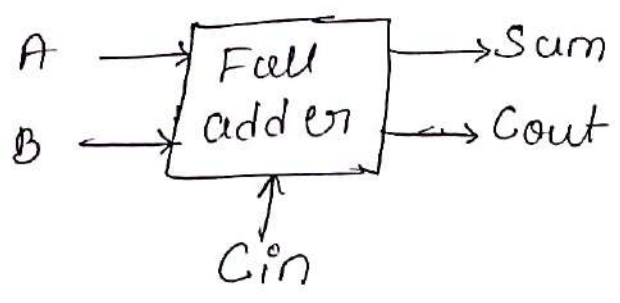
where:
A and B: Bits to be add
Cin: carry i/p from the previous stage.
S: sum
Cout: carry out to next stage.

Truth table of Full adder.

A	B	Cin	Sum	Cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

Boolean expression of full adder.

$$S = \bar{A}\bar{B}C_{in} + \bar{A}B\bar{C}_{in} + A\bar{B}\bar{C}_{in} + ABC$$

$$C_{out} = \bar{A}BC_{in} + A\bar{B}C_{in} + AB\bar{C}_{in} + ABC$$

implementation of sum and carry of Full adder using basic gate.

Sum implementation

curry implementation.
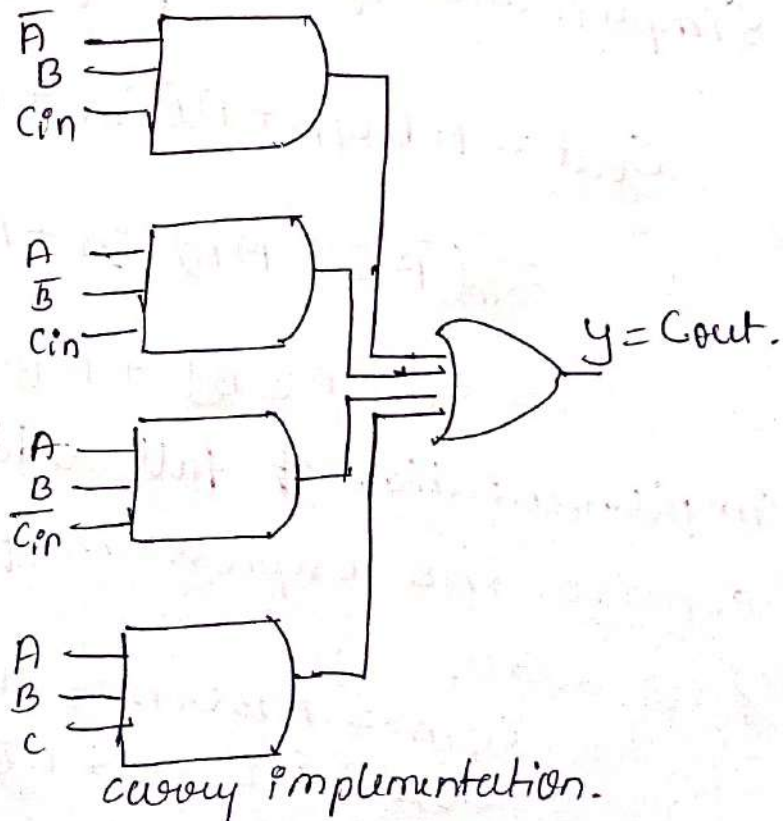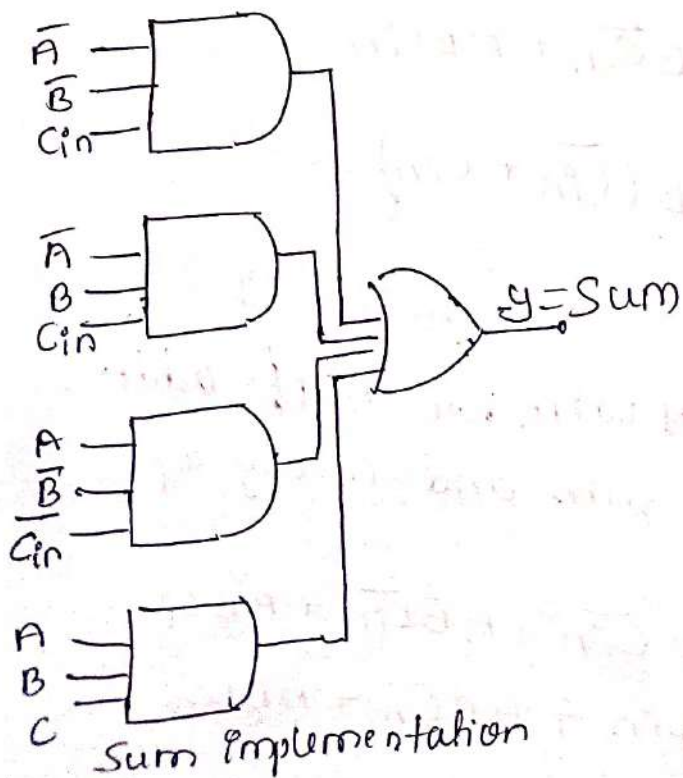
Expression for Sum & carry after simplification 44

using Boolean algibra.

simplification of sum of full adder

$Sum = \bar{A}\bar{B}C_{in} + \bar{A}B\bar{C_{in}} + A\bar{B}\bar{C_{in}} + ABC_{in}$

$= C_{in}[\bar{A}\bar{B} + AB] + \bar{C_{in}}[\bar{A}B + A\bar{B}]$

$= C_{in}[\overline{A \oplus B}] + \bar{C_{in}}[A \oplus B]$

Lit take $u = A \oplus B$

$= C_{in}\bar{u} + \bar{C_{in}}u$

$= C_{in} \oplus u$

Substitute u value

then $Sum = C_{in} \oplus A \oplus B$

or

$$\boxed{Sum = A \oplus B \oplus C_{in}}$$

Simplification of carry of full adder.

$C_{out} = \bar{A}BC_{in} + A\bar{B}C_{in} + AB\bar{C_{in}} + ABC_{in}$

$= C_{in}(\bar{A}B + A\bar{B})C_{in} + AB(\bar{C_{in}} + C_{in})$

$= C_{in}[A \oplus B] + AB$ $[\because \bar{C_{in}} + C_{in} = 1]$

implementation of full-adder with two half adder.

consider the expression of sum and carry of

full adder

$Sum = \bar{A}\bar{B}C_{in} + \bar{A}B\bar{C_{in}} + A\bar{B}\bar{C_{in}} + ABC_{in}$

$C_{out} = \bar{A}BC_{in} + A\bar{B}C_{in} + AB\bar{C_{in}} + ABC_{in}$

[do the simplification]

then

$$Sum = A \oplus B \oplus Cin$$

$$Cout = Cin[A \oplus B] + AB$$

implementation of a full adder using two half adder.

$$Sum = A \oplus B \oplus Cin$$

$$Cout = Cin(A \oplus B) + AB.$$

Block diagram.

$$Sum = A \oplus B \oplus Cin$$

$$Cout = Cin(A \oplus B) + AB$$
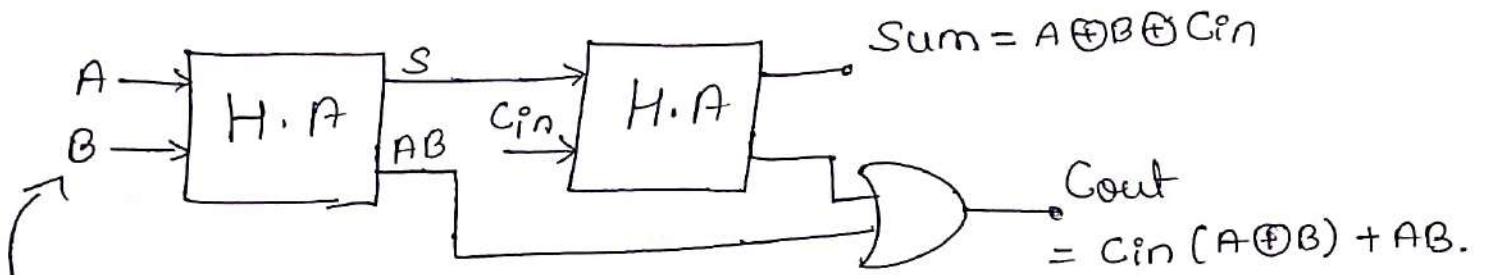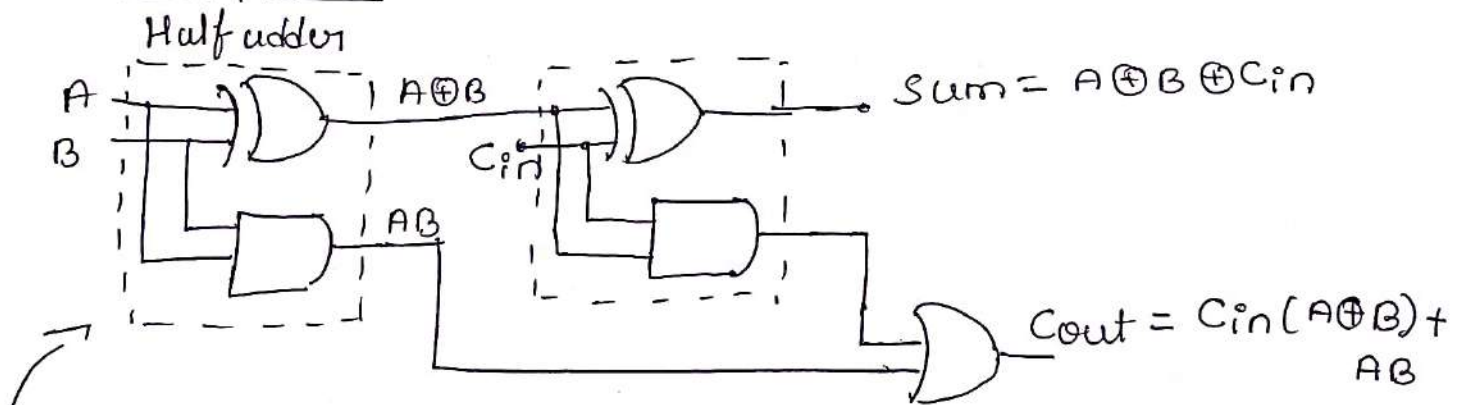
logic Diagram.

Parallel adder.

A parallel adder is a digital circuit capable of finding the arithmetic sum of two binary numbers that is greater than one bit in length.

It consists of full adders connected in a chain where the output carry from each full adder is connected to the carry input of the next full adder in the chain.

A n bit parallel adder requires n full adders to perform the operation.

4-bit parallel adder.

block diagram

fig(a): 4 bit full adder.

Eu:!!

$A = 0$ Coul, Cin A_3 Cin A_2 A_1 A_0 ← Cin = 0   ल्ला.ब्र

(47)

+ $B = 0$ B_3 B_2 B_1 B_0

Coul S_3 S_2 S_1 S_0

Coul (c_3) C_2 C_1 C_0
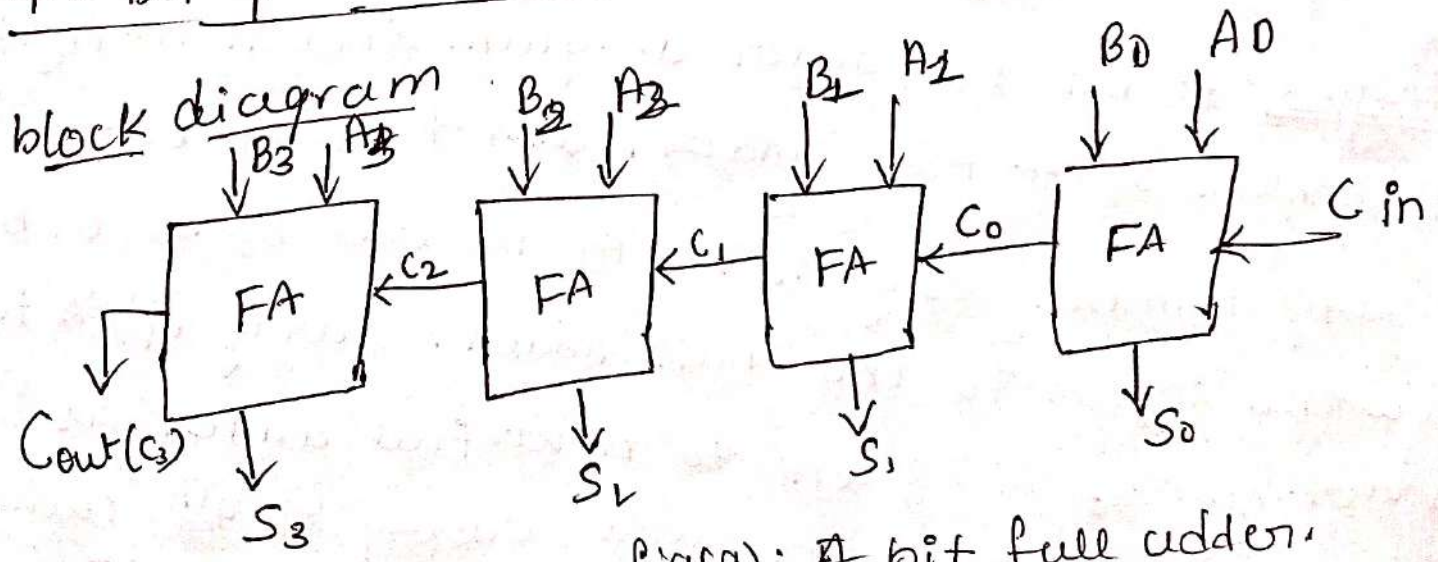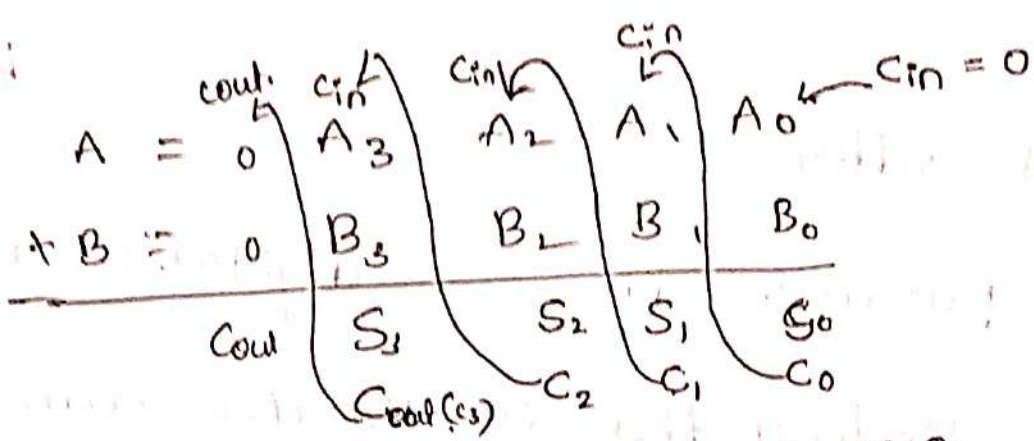
C_3 or Coul = can be 1 or 0.

Let A =

Truth -table.

A3	A2	A1	A1	B3	B2	B1	B0	Cout	S3	S2	S1	S0
1	0	0	1	1	0	1	1	1	0	1	0	0
0	1	1	0	1	1	0	1	1	0	0	1	1
1	1	0	1	0	0	1	0	0	1	1	1	1
1	1	1	0	0	0	0	1	1	0	0	0	1

$$
\begin{array}{r}
1\,0\,0\,1 \\
+\ 1\,0\,1\,1 \\
\hline
[1]\,0\,1\,0\,0
\end{array}
$$
↑carry.

$$
\begin{array}{r}
0\,1\,1\,0 \\
1\,1\,0\,1 \\
\hline
[1]\,0\,0\,1\,1
\end{array}
$$
↑carry

$$
\begin{array}{r}
1\,1\,0\,1 \\
0\,0\,1\,0 \\
\hline
1\,1\,1\,1
\end{array}
$$

$$
\begin{array}{r}
1\,1\,1\,0 \\
0\,0\,1\,1 \\
\hline
[1]\,0\,0\,0\,1
\end{array}
$$
↑carry
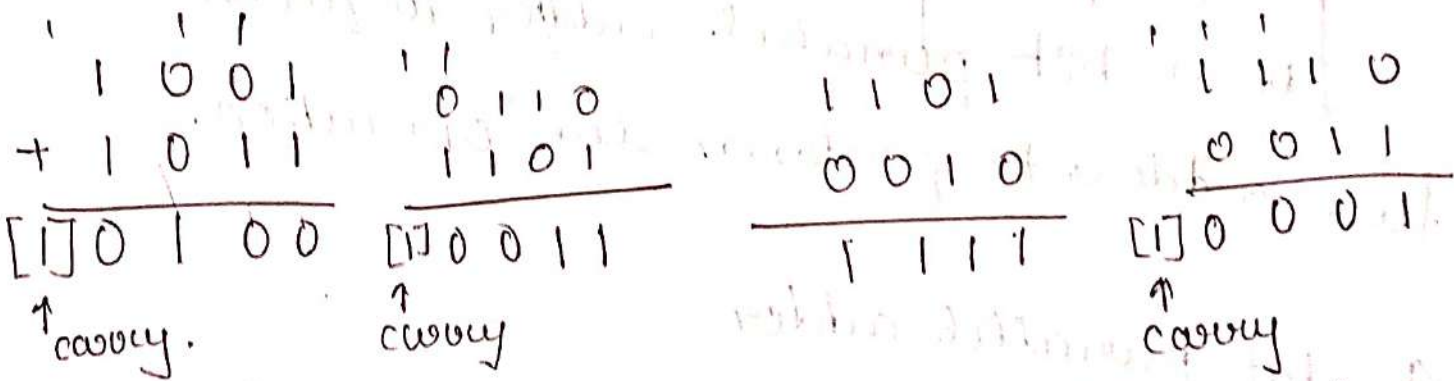
Theory 4 bit full adder diagram shown in fig(a)
it consists of 4 Full adder. aad two 4 bit
binary number say A_3 A_2 A_1 A_0 and B_3 B_2 B_1 B_0
are the inputs to the Full adder. carry of 1's full
adder say C_0 is given to next full adder as
carry in. and so on and carry of 4th full add
-er in the carry out (Cout).

Module 4.

Operational Amplifier and oscillators.

An operational amplifier or op-amp is a high gain differential amplifier. its behaviour can be controlled by adding suitable feed back.

The op-amps are mainly used for performing mathematical operation such as addition, subtraction multiplication, integration and differentiation. Hence the name operational Amplifier (op-amp).

circuit symbol.

inverting V_1
i/p

non inverting V_2
-ny i/p

$+VCC$

op-amp

V_0 (output)

$-V_{EE}$
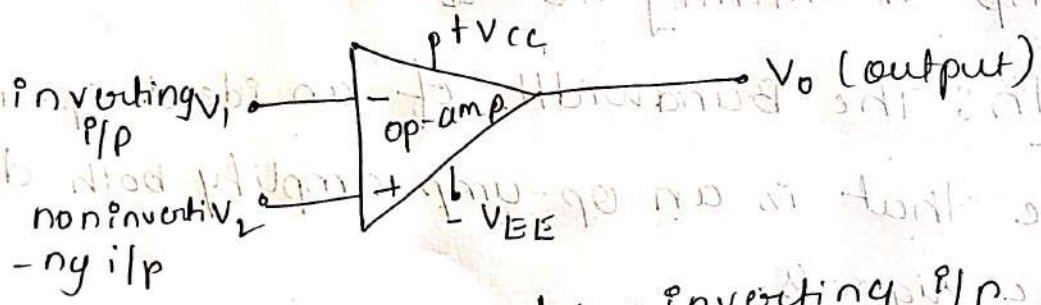
It has two inputs - inverting i/p & non inverting input & one output. Since op-amp is an active device, it requires a dc power supply for its operation.

The op-amp is also known as differential Amplifier.

Ideal characteristics of opamps.

1) Infinite Input Impedance: The op-amp does not draw any current from the voltage sources connected to its input terminals. Thus its input resistance is infinite i.e $R_{in} = \infty$

2) Zero output impedance: The output voltage of an ideal op-amp is independent of the current drawn from it, Thus it has zero o/p resistance i.e $R_0 = 0$

3) Open-loop voltage gain [A_{OL}]: open loop voltage gain of an op-amp is infinity i.e $A_{OL} = \infty$

4) Band width: The Bandwidth of an ideal op-amp is infinite that is an op-amp amplify both dc a well as ac signals.

5) Infinite CMRR: The common mode rejection ration of an ideal op-amp is infinite CMRR = ∞

6) slew rate: In ideal op-amp has infinite slew rate $SR = \infty$, this means that the output voltage changes simultaneously with the output voltage.

7) Zero PSRR: The power supply rejection ratio of an ideal op-amp is zero.

3) Zero offset voltage: The presence of small output voltage when $V_1 = V_2 = 0$ is called an offset voltage.

it is zero for an ideal op-amp.

Parameter	Symbol	Ideal op-amp	Practical Op-amp [IC 741]
① open loop gain	AOL	∞	2×10^5
② Input impedance	Zin	∞	$1 M\Omega$
③ output impedance	Zout	0	75Ω
Band width	B.W	∞	$1 MH_3$
CMRR	CMRR	∞	$90 dB$
Slew rate	SR	∞	$0.5 V/\mu sec$
PSRR	PSRR	0	$30 \mu V/volt$
offset voltage	Vios & Voos	0	$2 mv$

Common mode Rejection ratio [CMRR]:

" It is defined as the ratio of the differential voltage gain Ad to common mode voltage gain Ac".

i.e. $\boxed{CMRR = \dfrac{Ad}{Ac}}$ $Gain = \dfrac{V_o}{V_{in}}$

It is the ability of the op-amp to reject a power -on mode signal. i.e produces zero o/p when the i/ps are same.

for an ideal op-amp $A_c = 0$ i.e common mode Voltage gain is zero, hence ideal value of CMRR is infinite.

CMRR is also expressed in dB, as

$$CMRR \text{ in } dB = 20 \log_{10}\left[\frac{A_d}{A_c}\right]$$

The typical value of CMRR for $\mu A741$ I_c is 90dB

Slew Rate (SR)

Slew rate is a measure of how fast the op-amp o/p can change with respect to the change in the input signal,

" Slew rate of the op-amp is defined as the maximum time rate of change of its output voltage expressed in volts per microsecond."

$$SR = \frac{dV_0}{dt}\bigg|_{maximum}$$

for IC741, SR is 0.5 V/μsu

Ideal value of SR is ∞
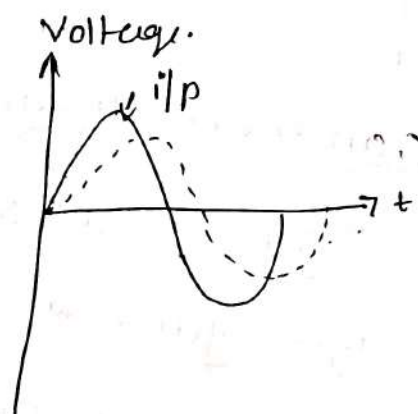
Power supply Rejection Ration [PSRR]:

The power supply rejection ratio is defined as the ratio of the change in input offset voltage due to the change in supply voltage.

$$PSRR = \frac{\Delta V_{ios}}{\Delta V_{CC}}$$

It is expressed in mV/V or $\mu V/V$. The ideal value of PSRR is zero, For $\mu A7HIIC$ it is $30\mu V/V$.

offset voltage

⟹ Input offset voltage [Vios

when $V_1 = V_2 = 0$, then output must be zero, But practically o/p is not zero. To make this output zero a small dc voltage is applied to any one of thee i/p terminals. this small dc voltage is called i/p offset voltage.
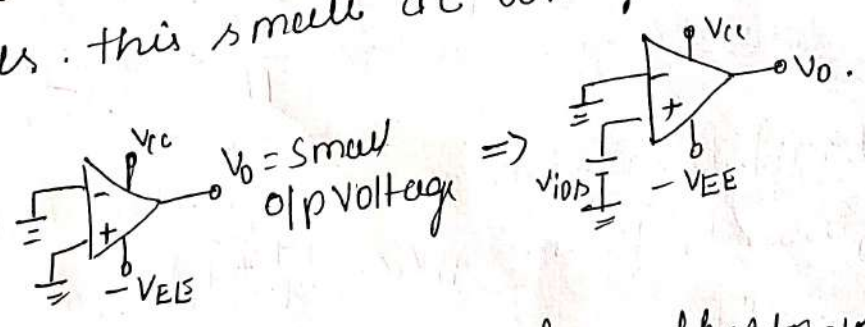
o/p offset voltage [Voos]: when offset vot both i/ps are zero i.e $V_1 = V_2 = 0$, the o/p must be zero But practically a small voltage is present at the o/p. this voltage is called as o/p offset voltage.

Block diagram of op-amp:

The block diagram of op-amps consists of four stages shown in fig(a).

```
i/p 1 ○──  ┌─────────┐      ┌──────────────┐      ┌──────────────┐      ┌─────────┐   o/p
       ─   │  Input  │ ───→ │ Intermediate │ ───→ │  Buffer & level│ ───→ │ Output  │ ──→ o/p
           │  Stage  │      │    Stage     │      │ Shifting Stage │      │  Stage  │
i/p 2 ○──  │         │      │              │      │                │      │         │
       +   └─────────┘      └──────────────┘      └──────────────┘      └─────────┘
               [1]                [2]                    [3]                 [4]
```
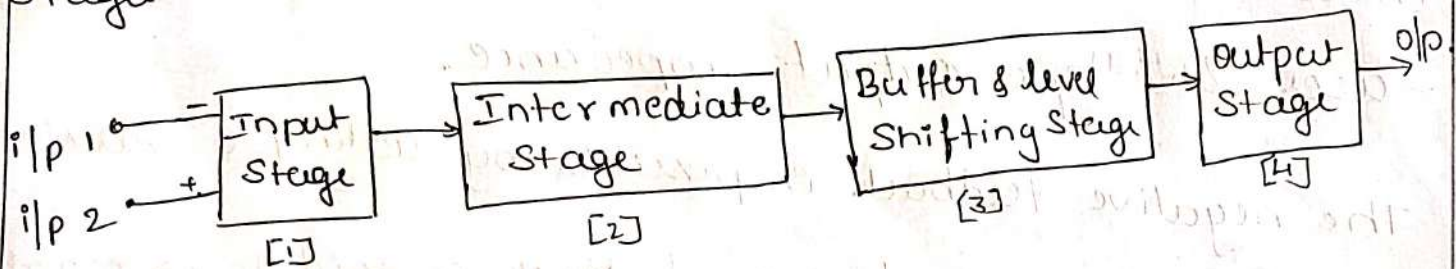
1) input stage: The basic requirements of i/p stage are

→ It has high voltage gain

→ two i/p terminals

→ It has high i/p impedance

→ high CMRR

The dual i/p, balanced output differential amplifier satisfies all these requirements.

2) Intermediate stage: The main function of intermediate stage is to provide an additional voltage gain.
This stage consists of cascaded amplifiers called as multistage amplifiers.

3) Level shifting stage: It brings the dc level down to ground potential when no signal is applied.

4) o/p Stage: the basic requirements of output stage are

 * low o/p impedance
 * Short ckt protection
 * low power dissipation

A push-pull class AB or class B amplifier satisfies all the requirements.

Neccessity of -ve feedback in an Op-amp:

-ve feedback increases the frequency bandwidth in which the gain curve remains flat and decre

- ases the opp output impedance.

The negative feedback is possible by adding a resistor called feedback resistor. the feedback is said to be negative as the feedback resister (Rf) connects the output to the inverting input terminal.
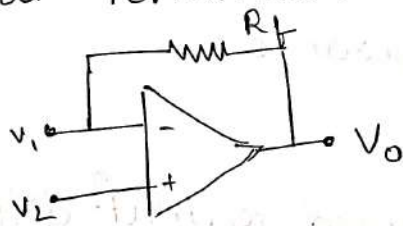
Advantages of -ve feedback:

→ Reduces the gain

→ increases the B.W & frequency range.

→ It increases the i/p resistance.

→ It decreases the o/p resistance.

Due to Rf, overall gain reduces and it is called as closed loop gain or gain with feedback Af.

Concept of virtual ground.

Consider a -ve feedback from ckt as shown in fig.
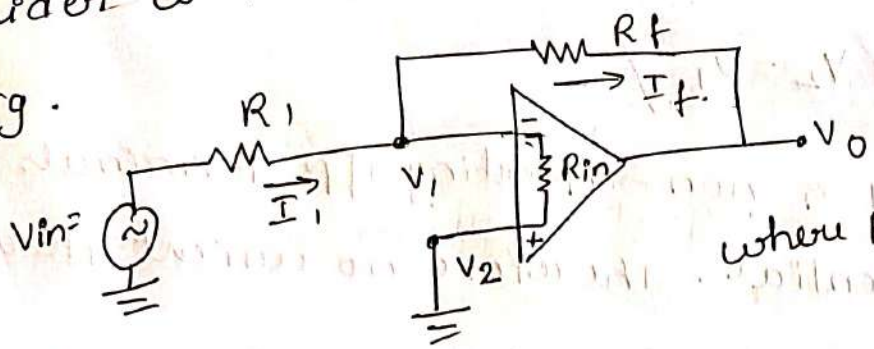
where Rin - i/p resistance of op-amp.

The o/p voltage is given by

$$V_0 = A_{OL}(V_2 - V_1)$$

or

$$V_2 - V_1 = \frac{V_0}{A_{OL}}$$

W.K.T o/p voltage cannot exceed the dc supply voltage V_{cc}

i.e $V_0 < V_{cc}$ Let $V_{cc} = 12V$

& $A_{OL} = 2 \times 10^5$ for I_c 741

$$V_2 - V_1 = \frac{10}{2 \times 10^5} \quad [\because V_0 = 10v]$$

git an o/p voltage of 10v by applying an i/p. voltage Vin of 1V.

$$\Rightarrow V_2 - V_1 = \frac{10V}{2 \times 10^5} = 0.5\mu V.$$

This value is very small compared to the i/p voltage (Vin = 1V).

$$\text{so } V_2 - V_1 \cong 0 \text{ V}$$

or $\boxed{V_2 = V_1}$

the inverting & non-inverting i/p terminals are at the same potential. Therefore no current flows through Rin. Thus $V_d = V_2 - V_1 = 0$ V across Rin & current through Rin ~~too~~ is zero. This concept of virtual short is called virtual ground.

op-amp Applications.

1) Linear op-amp application: here o/p voltage V_g varies linearly with the i/p voltage. -ve feed back (R_f) is used.

     EG: Inverting, non inverting ampr, voltage follower, differentiator ampr etc.

2. Non-linear op-amp applications:- Here the feedback is provided from o/p to the inverting i/p terminal using diodes, transistors etc.

     Eg: comparators, clampers, ~~crossm~~ schmitt triggers, precision rectifiers.

Ideal Inverting Amplifier

* The i/p V_{in} is applied to the inverting input through resistor R_1 & the non-inverting terminal is grounded.

* Feed back from the o/p in applied through the feedback resistor R_f to inverting terminal.

* It provides a phase shift of $180°$ b/w i/p & o/p hence the name inverting amplifier.

An node B is connected to GND. From the concept of virtual GND
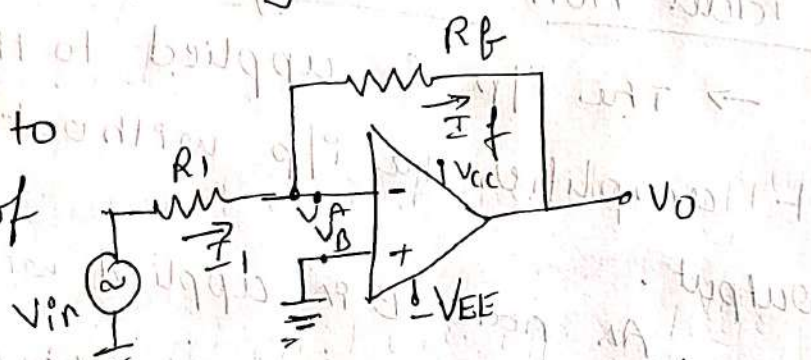
$$V_B = V_A = 0V. \longrightarrow ①$$

ckt: inverting amplifier.

Apply KCL @ node A.

$$I_1 = I_f \longrightarrow ②$$

from the ckt.

$$I_1 = \frac{V_{in} - V_A}{R_1} \quad \& \quad I_f = \frac{V_A - V_o}{R_f}$$

sub I_1 & I_f value to eqⁿ ②

$$\frac{V_{in} - V_A}{R_1} = \frac{V_A - V_o}{R_f}$$

sub value of $V_A = 0$. [∵ eqⁿ ①]
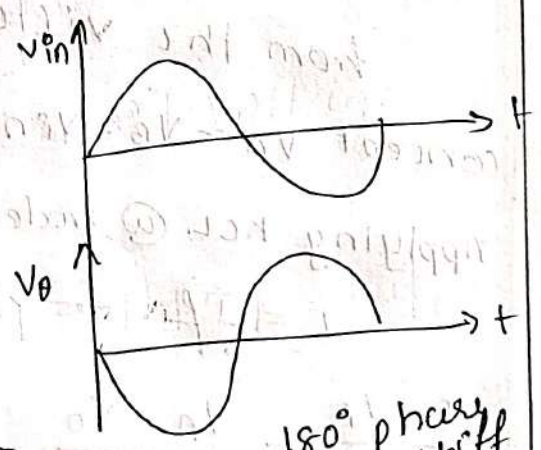
180° phase shift b/w vin & vo.

$$\frac{V_{in}}{R_1} = \frac{-V_0}{R_f}$$

$$\boxed{V_0 = \frac{-R_f}{R_1} V_{in}}$$

or

$$\boxed{A_f = \frac{V_0}{V_{in}} = \frac{-R_f}{R_1}}$$ gain depends only on R_f & R_1.

idеаl non-inverting amplifier.

→ The i/p is applied to the non-inverting terminal it amplifies the i/p without any phase shift in the output.

As node B is applied with a input voltage V_{in}, hence voltage at node A is also same.

from the virtual GND

concept $V_A = V_B = V_{in} \longrightarrow$ ①

Applying KCL @ node A.

$$I = I_f \longrightarrow ②$$

$$\frac{0 - V_A}{R_1} = \frac{V_A - V_0}{R_f}$$

But eqⁿ ① $V_A = V_{in}$

sub V_A ± in eqt

$$\frac{-V_{in}}{R_1} = \frac{V_{in} - V_0}{R_f}.$$
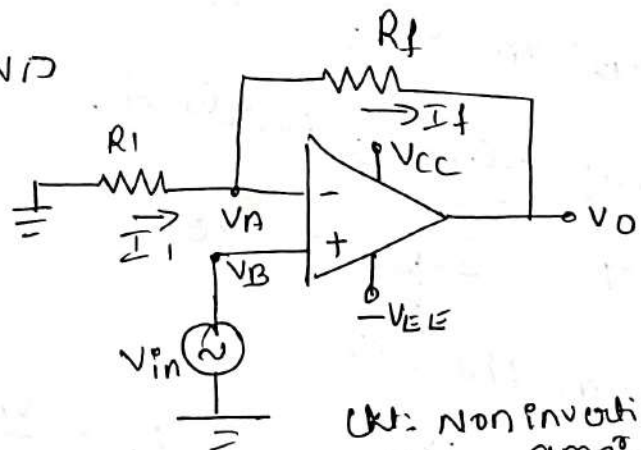
ckt: Non inverting ampr.

$$\frac{V_0}{R_f} = \frac{V_{in}}{R_f} + \frac{V_{in}}{R_1}$$

$$\frac{V_0}{R_f} = V_{in}\left[\frac{1}{R_f} + \frac{1}{R_1}\right]$$

$$V_0 = V_{in}\left[1 + \frac{R_f}{R_1}\right]$$

or
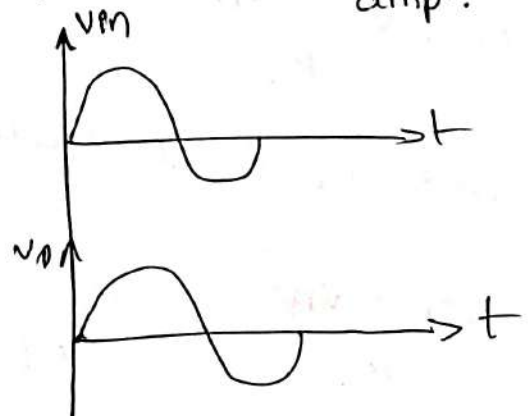
$$V_0 = \left(1 + \frac{R_f}{R_1}\right)V_{in}$$

$$A_0 = \frac{V_0}{V_{in}} = 1 + \frac{R_f}{R_1}$$

Gain with feedback depends only R_f a R_1

* A_f is always greater than 1 for non inverting amplifier.

voltage follower

Voltage follower is a ckt in which the o/p voltage follows the input voltage.

It is also called source follower or unity gain amplifier, buffer amplifier etc.

The ckt for voltage follower is show in fig(a)

At Node B, the input Vin is applied & hence $V_B = Vin$ & node A is connected to o/p.

from the concept of virtual GND.

$$V_B = V_A = Vin \longrightarrow ①$$

As Vo is directly connected to node A,

$$V_0 = V_A$$

from eqn ①

$$\boxed{V_0 = Vin}$$

or

$$\left\langle \frac{V_0}{Vin} = 1 \right\rangle$$

The o/p voltage Vo is equal to Vin, if Vin ↑es then Vo ↑es & if Vin ↓es then Vo also ↓es.

Fig(a): voltage follower ckt.

Advantages.

* It has large Bandwidth
* very large i/p resistance & low o/p resistance.

Difference between Ideal Inverting Amplifier & Ideal non inverting amplifier.

Ideal Inverting Amplifier	Ideal non-inverting Amp^r
1) voltage gain $A_f = -\dfrac{R_f}{R_1}$	1) voltage gain $A_f = 1 + \dfrac{R_f}{R_1}$
2) there is a phase shift of $180°$ between i/p & o/p	2) No phase shift between i/p & o/p
3) voltage gain can be varied to greater than or lesser than or equal to unity	3) voltage gain is always greater than unity (one)
4) Input impedance is high	4) Input impedance is extremely high

Summer or Adder Circuit:

The ckt which gives the addition of the applied i/p signals is called adder or summer ckt.

There are two types of summer ckt.

a) Inverting summer

b) Non-inverting summer.

Inverting Summer.

ckt for inverting summer is shown in fig (a). In this ckt, all the i/p's to be added are applied to the inverting input terminal of an op-amp.

The i/p signals V_1 & V_2 are applied through R_1 & R_2 as shown in fig (a).

From the concept of virtual ground
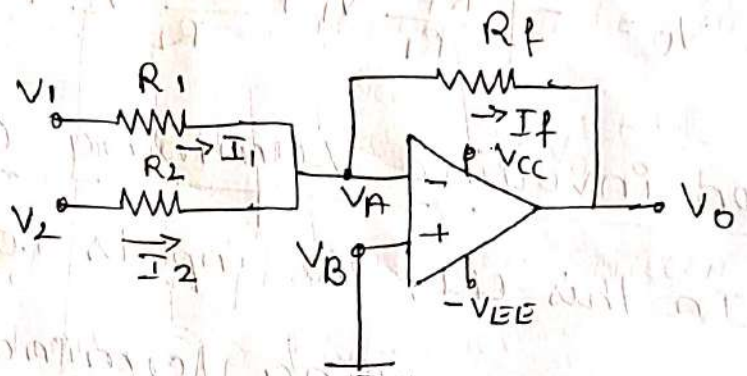
$$V_B = V_A = 0 \longrightarrow ①$$

Apply KCL @ node A.

$$I_1 + I_2 = I_f \longrightarrow ②$$

From the ckt

$$\frac{V_1 - V_A}{R_1} + \frac{V_2 - V_A}{R_2} = \frac{V_A - V_0}{R_f} \longrightarrow ③$$

from eqn ① $V_A = 0$ then eqn ③ becomes

$$\frac{V_1 - 0}{R_1} + \frac{V_2 - 0}{R_2} = \frac{0 - V_0}{R_f}$$

$$\frac{V_1}{R_1} + \frac{V_2}{R_2} = \frac{-V_0}{R_f}$$

(or)

$$V_0 = - R_f \left[\frac{V_1}{R_1} + \frac{V_2}{R_2} \right]$$

$$V_0 = -\left[\frac{R_f}{R_1} V_1 + \frac{R_f}{R_2} V_2\right]$$

if $R_1 = R_2 = R_f$ then

$$\boxed{V_0 = -[V_1 + V_2)}$$ for inverting summer.

Note :when V_1, V_2, V_3 & V_4 are the i/p's then,

$$V_0 = -\left[\frac{R_f}{R_1} V_1 + \frac{R_f}{R_2} V_2 + \frac{R_f}{R_3} V_3 + \frac{R_f}{R_4} V_4\right]$$

Non inverting summing circuit.

In this ckt, the inputs to be added are applied to the noninverting terminal of an op-amp.

from the concept of virtual GND,

$$V_B = V_A \qquad \longrightarrow \textcircled{1}$$

Apply KCL @ node A,

$$I = I_f \longrightarrow \textcircled{2}$$

from ckt,

$$\frac{0 - V_A}{R} = \frac{V_A - V_0}{R_f} \longrightarrow \textcircled{3}$$
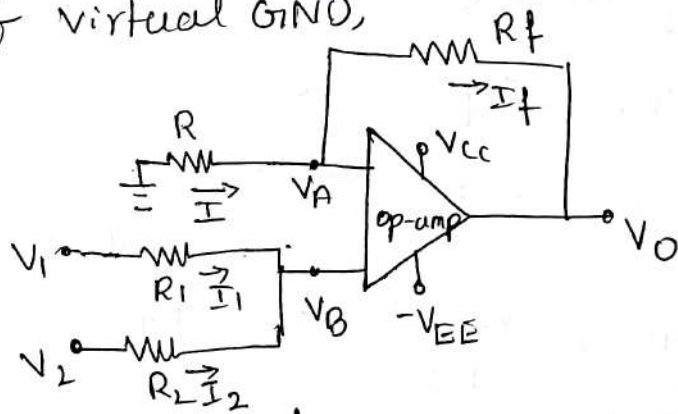
fig(a): Non -inverting summing ckt.

from eqn $\textcircled{1}$ $V_B = V_A$, then eqn $\textcircled{3}$ becomes

$$\frac{0 - V_B}{R} = \frac{V_B - V_0}{R_f}$$

(or) $\dfrac{V_0}{R_f} = \dfrac{V_B}{R_f} + \dfrac{V_B}{R}$

$\dfrac{V_0}{R_f} = V_B\left[\dfrac{1}{R_f} + \dfrac{1}{R}\right]$

$V_0 = V_B\left[1 + \dfrac{R_f}{R}\right] \longrightarrow ④$

Apply KCL @ node B

$I_1 + I_2 = 0$

$\dfrac{V_1 - V_B}{R_1} + \dfrac{V_2 - V_B}{R_2} = 0$

$\dfrac{V_1}{R_1} + \dfrac{V_2}{R_2} = \dfrac{V_B}{R_1} + \dfrac{V_B}{R_2}$

$\dfrac{V_1}{R_1} + \dfrac{V_2}{R_2} = V_B\left[\dfrac{1}{R_1} + \dfrac{1}{R_2}\right]$

$V_B = \dfrac{\dfrac{V_1}{R_1} + \dfrac{V_2}{R_2}}{\dfrac{1}{R_1} + \dfrac{1}{R_2}} \longrightarrow ⑤$

Sub eq^n ⑤ in eq^n ④

$V_0 = \left(\dfrac{\dfrac{V_1}{R_1} + \dfrac{V_2}{R_2}}{1/R_1 + 1/R_2}\right)\left(1 + \dfrac{R_f}{R}\right)$

If $R_1 = R_2 = R_f = R$ then

$$\boxed{V_0 = V_1 + V_2}$$

Integrator

In the integrator circuit, the output voltage is the integration of the input voltage.

The node B is grounded & hence from the virtual gnd. concept,

$$V_A = V_B = 0 \longrightarrow ①$$

Apply KCL @ node A

$$I = I_f$$

$$\frac{V_{in} - V_A}{R} = \cancel{V_{out}} \; C_f \frac{d}{dt}[V_A - V_0]$$

But from eqn ①

$$\therefore \frac{V_{in}}{R} = C_f \frac{d}{dt}[-V_0]$$

$$\frac{V_{in}}{R} = -C_f \frac{dV_0}{dt}$$

$$\frac{dV_0}{dt} = \frac{-V_{in}}{C_f R}$$

integrate both the side w.r.t 't'
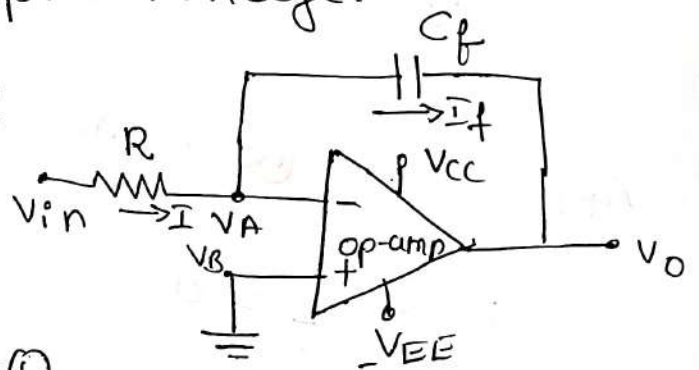
$$\int_0^t \frac{dv_0}{dt} = -\frac{1}{RC_f} \int_0^t v_{in} \cdot dt$$

$$V_0 = -\frac{1}{RC_f} \int_0^t v_{in} \, dt$$

where $\tau = RC_f$ is called time constant.

* -ve sign indicates $180°$ phase shift b/w i/p & o/p.

* If C_f is large, then time constant is large hence the perfect o/p.

Application: In analog computers, A to D converters, ramp wave generators, wave shaping ckt etc.

Differentiator:

In the Differentiator ckt, the output voltage is the differentiation of its input voltage.

From the concept of virtual ground concept, $V_B = 0$ &

hence $V_B = V_A = 0V \longrightarrow ①$

Apply KCL @ node A
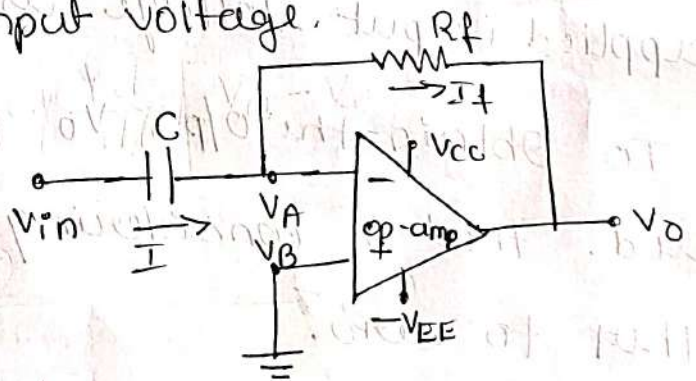
fig(a): ckt of Differentiator

$$I = I_f$$

$$C\frac{d}{dt}[v_{in} - V_A] = \frac{V_A - V_0}{R_f}$$

sub value of $V_A = 0V$

$$C \frac{d(v_{in})}{dt} = \frac{-v_0}{R_f}$$

or
$$v_0 = -R_f C \frac{d}{dt}(v_{in})$$

where $\tau = R_f C$ is called time constant of different
-ator.

* -ve sign indicates $180°$ phase shift b/w input &
output.

Application :-
* In wave shaping ckt, ramp wave generator etc.

Subtractor or Difference Amplifier:

The ckt which gives the difference of the
applied input voltage is called subtractor.

To obtain the o/p, v_0 superposition principle is
used. that is considering one i/p @ a time setting
other to zero.

The ckt diagram for subtractor amplifier
is shown in ckt (a).
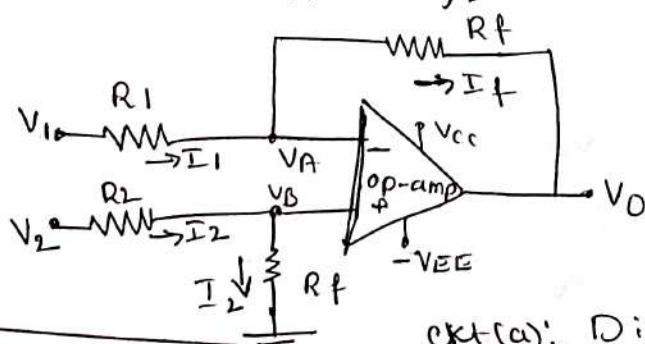
ckt (a): Difference Amplifier.

V_{01} be the output when only V_1 is applied & set $V_2 = 0 V$.

To Find V_{01}, ckt acts as inverting ampr, then ckt becomes [shown in fig(b)]

$$V_{01} = -\frac{R_f}{R_1} V_1 \longrightarrow \text{①}$$

fig(b): $V_1 = V_{in}$ & $V_2 = 0$

$R_1 || R_f = 0$.
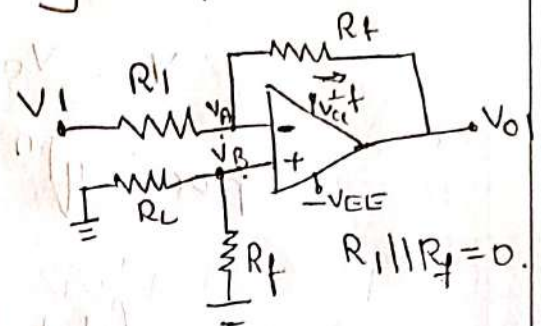
let V_{02} be the o/p when only V_2 is applied by setting $V_1 = 0V$

To find V_{02} [when $V_1 = 0V$], the ckt becomes non inverting amplifier. then ckt is shown in fig(c).

For a non-inverting ampr, the o/p is given by

$$V_{02} = \left(1 + \frac{R_f}{R_1}\right) V_B \longrightarrow \text{②}$$
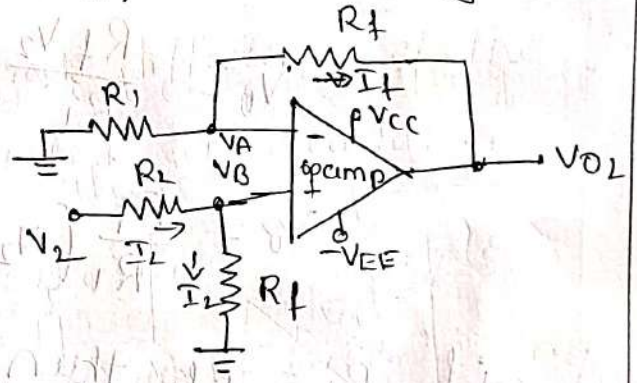
where V_B is the i/p voltage applied @ non-inverting terminal.

To find V_B Apply voltage divider rule
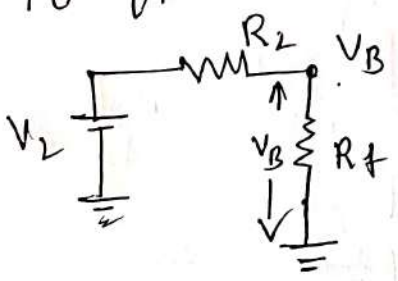
$$\therefore V_B = \frac{V_2 \times R_f}{R_2 + R_f} \longrightarrow \text{③}$$

then eqn ② becomes.

$$V_{O2} = \frac{V_2 R_f}{R_2 + R_f}\left(1 + \frac{R_f}{R_1}\right) \longrightarrow ④$$

The total o/p voltage V_O due to V_1 and V_2 are

$$V_0 = V_{O1} + V_{O2}$$

from eqⁿ ① & ④

$$V_0 = \left(1 + \frac{R_f}{R_1}\right)\frac{R_f V_2}{R_2 + R_f} - \frac{R_f}{R_1}V_1$$

$$V_0 = \left(\frac{R_1 + R_f}{R_1}\right)\left(\frac{R_f V_2}{R_2 + R_f}\right) - \frac{R_f}{R_1}V_1$$

if $R_1 = R_2$ then

$$V_0 = \frac{R_f V_2}{R_1} - \frac{R_f}{R_1}V_1$$

$$V_0 = \frac{R_f}{R_1}\left(V_2 - V_1\right)$$

if $R_1 = R_f$ then

$$\boxed{V_0 = V_2 - V_1}$$ Hence the Subtractor.

Oscillators.

" An oscillator is an amplifier which uses posi -tive feed back & without any external i/p signal, genera -tes constant oscillation of desired frequency.

Desired frequency is decided by its circuit components.

An oscillator is bascically a signal generator that produces a sinusoidal or non sinusoidal s/l of some particular frequency.

Barkhausen's creteria.

* Consider a basic inverting amp^r with open loop gain A.
* The feed back network attenuation factor β is less than unity (β < 1.)

$V_s^o = 0$ feed back acts as i/p.

Vi → inverting amp^r A → Vo

Vf → feed back n/w β
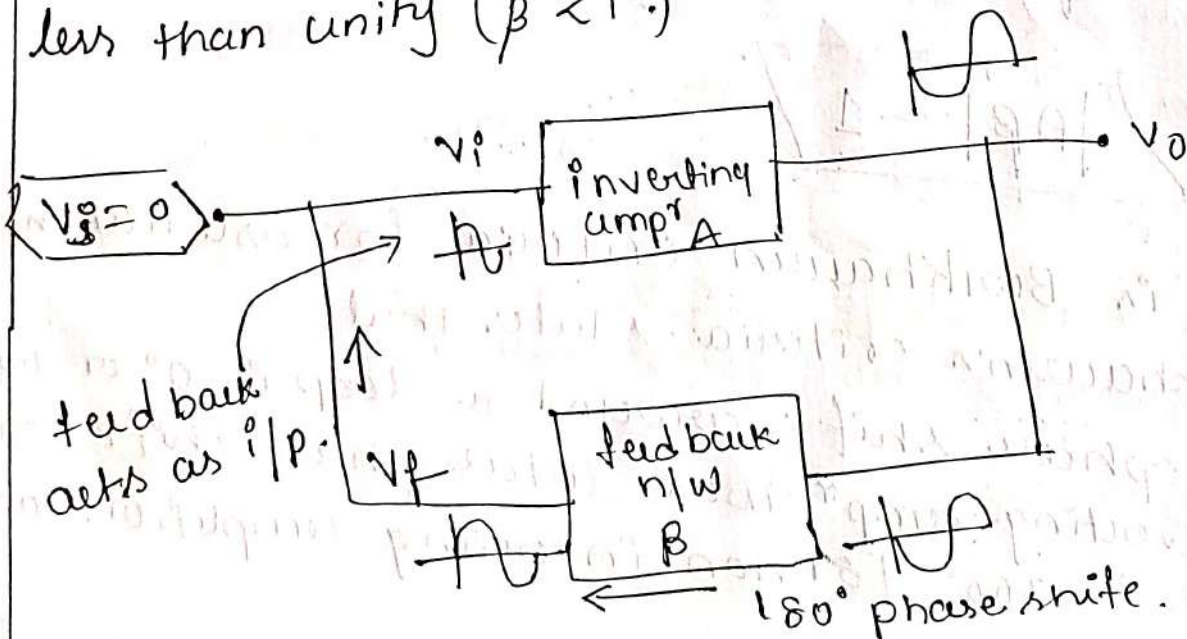
180° phase shift.

An basic amplifier is inverting, it introduces a phase shift of $180°$ b/w i/p and o/p

For an oscillator, the feedback must be positive

The feedback network must introduce a phase shift of $180°$

$$A = \frac{V_o}{V_i}$$

$$V_o = A V_i$$

$$\beta = \frac{V_f}{V_o} \Rightarrow V_f = \beta V_o$$

$$V_f = \beta \times A V_i$$

$$\boxed{V_f = A\beta V_i}$$

for an oscillator, the feedback n/w drives the amplifier. V_f act as V_i so that $V_f = V_i$

$$\boxed{|A\beta| = 1}$$

This is Barkhausin criteria for oscillation.

The Barkhausin's criteria states that.
1) Total phase shift around a loop is $0°$ or $360°$. (for inverting amp' that total phase shift around a loop is $360°$. for non-inverting amplifier, total

phase shift around a loop is $0°$).

2) $|A\beta| = 1$

case 1

i) if $|A\beta| > 1$, The o/p oscillates with growing type.
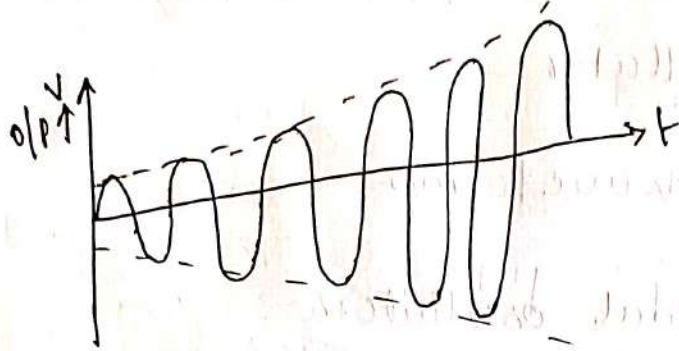
ii) if $|A\beta| < 1$, oscillator produces oscillation with decaying type.
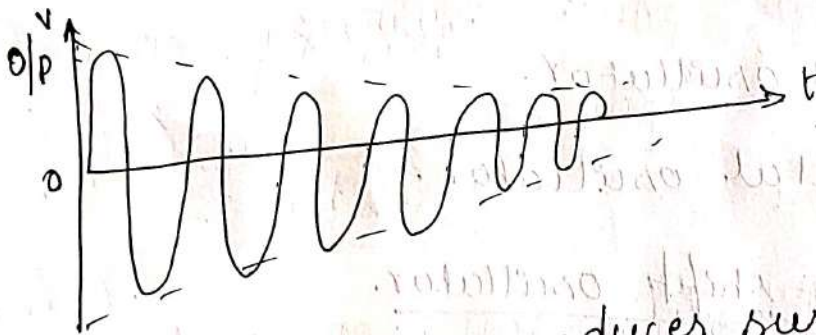
iii) if $|A\beta| = 1$ oscillator produces sustained oscillation i.e oscillations with constant amplitude & frequency.
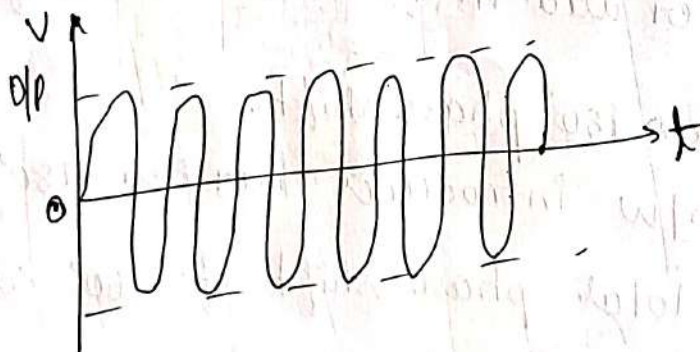
classification of Oscillators..

1) Based on frequency generation

   1 AF oscillators

   2 RF oscillator

   3 UHF oscillator

2) Base on waveforms

   i) sinusoidal oscillators

   ii) Non-sinusoidal oscillators.

3. Based on components.

   1) LC oscillator

   2) RC oscillator

   3) crystal oscillator.

RC phase-shift oscillator.

* RC phase shift oscillator consists of an amplifier ckt & a feedback network consisting of resistors and capacitors arranged in ladder fashion.

* The amplifier used in this oscillator is of inverting type so it introduces 180° phase shift.

* feedback n/w introduces further 180° phase shift therefore a total phase shift of 360° around a loop.

i/p to feed back n/w

C   C   C

R   R   R

o/p of f/b n/w.
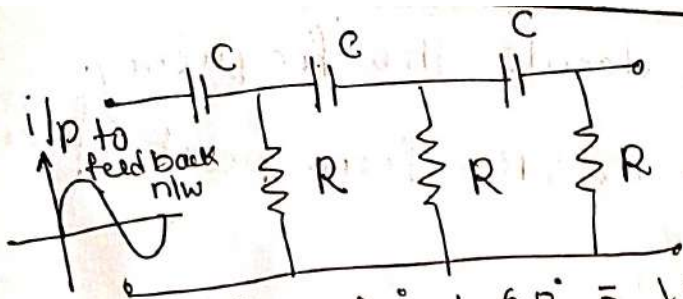
$60° + 60° + 60° = 180°$ phase shift.

fig: feed back network.

Rf

R

op-amp

Vo

sinusoidal o/p
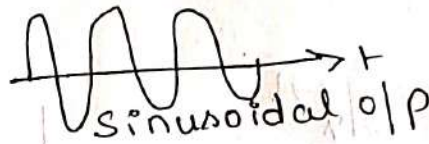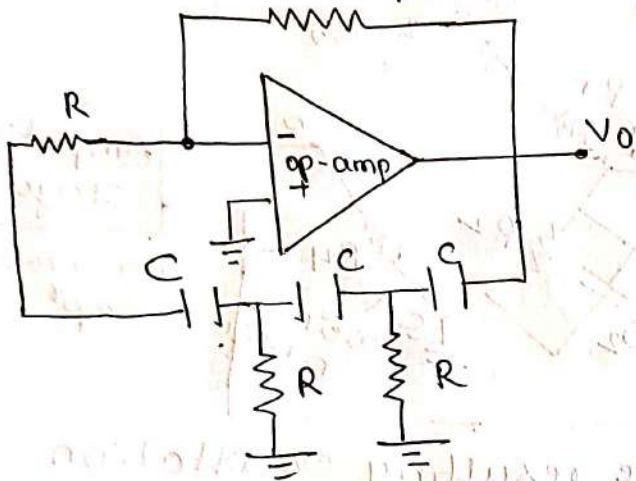
The frequency of oscillation satisfying the Barkhausn criteria is given by

$$f_0 = \frac{1}{2\pi RC\sqrt{6}} \quad \& \quad \beta = \frac{1}{29} : 180° \text{ phase shift}$$

W.K.T

$$A = \frac{-Rf}{R}$$

$$|A\beta| = \left| \frac{-Rf}{R} \times \frac{\pm 1}{29} \right|$$

$$= \frac{Rf}{29R} = 1$$

$$Rf = 29R$$

Wein bridge oscillator.

The two arms ad & cd are called frequency sensiti-ve arms. This is because the components of there

two arms $R_1 C_1$ and $R_2 C_2$ decide the frequency of the oscillator, Resistors R_3 & R_4 form part of the bridge.

The frequency of oscillation is given by

$$f_0 = \frac{1}{2\pi \sqrt{R_1 C_1 R_2 C_2}}$$ &

$$\beta = \frac{1}{2} \quad [\![\not\!\!\!]\!]$$

$$\frac{R_3}{R_4} = \frac{R_1}{R_2} + \frac{C_2}{C_1}$$
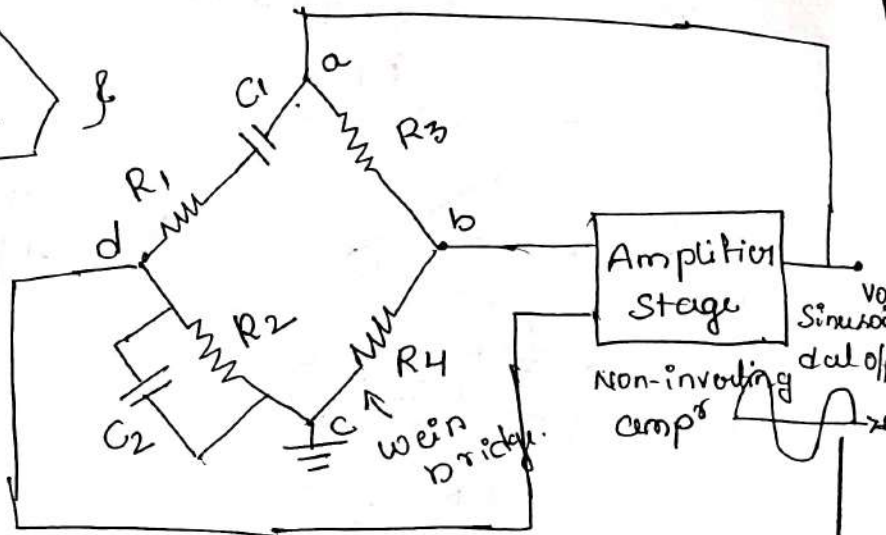
If $R_1 = R_2 = R$ & $C_1 = C_2 = C$ the resulting oscillation

frequency $f_0 = \frac{1}{2\pi R c}$ & $\frac{R_3}{R_4} = 2$

Thus $\frac{R_3}{R_4}$ must be greater than 2 to provide sustained oscillation.

To satisfy $|A\beta| = 1$

$$A = 1 + \frac{R_3}{R_4} \quad \longrightarrow \text{Non inverting ampr}$$

$$\therefore \left(1 + \frac{R_3}{R_4}\right) \times \beta = 1 \qquad \text{Sence } \frac{R_3}{R_4} = 2$$

$$3\beta = 1 \implies \boxed{\beta = \frac{1}{3}} \quad \& \quad \boxed{A \geq 3}$$

Problem 1: Find the o/p voltage and closed-loop gain.
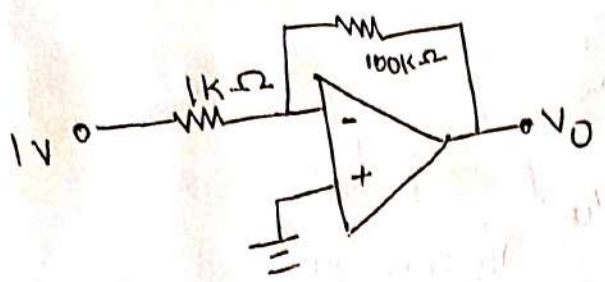
solution

given

$V_{in} = 1V$

$R_1 = 10k\Omega$

$R_f = 100k\Omega$

$V_0 = -\dfrac{R_f}{R_1} V_{in} \Rightarrow \dfrac{-100 \times 10^3}{10 \times 10^3} \times 1$

$$\boxed{V_0 = -10 V}$$

$A_v = \dfrac{V_0}{V_i} = \dfrac{-10}{1} = \underline{\underline{-10}}$

2) Find the o/p voltage and gain.
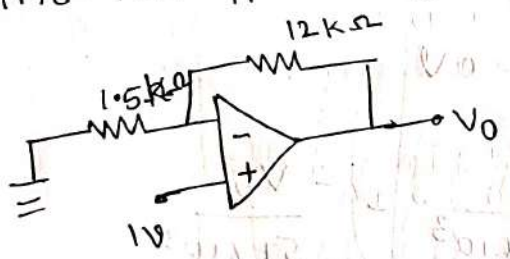
given

$V_{in} = 1V$

$R_f = 12k\Omega$

$R_1 = 1.5k\Omega$

$V_0 = \left[1 + \dfrac{R_f}{R_1}\right] V_{in}$

$= \left[1 + \dfrac{12 \times 10^3}{1.5 \times 10^3}\right] \times 1$

$= \left[1 + 8\right] \times 1$

$V_0 = 9V$

$A = \dfrac{V_0}{V_{in}} = \dfrac{9v}{1V} = \underline{\underline{9}}$

③ Determine the voltage gain of the Op-amp cht shown in the figure.

soluⁿ

given

$R_1 = 10k\Omega$

$R_f = 57k\Omega$

$V_{in} = ?$

$V_{beak} = ?$

$A = ?$
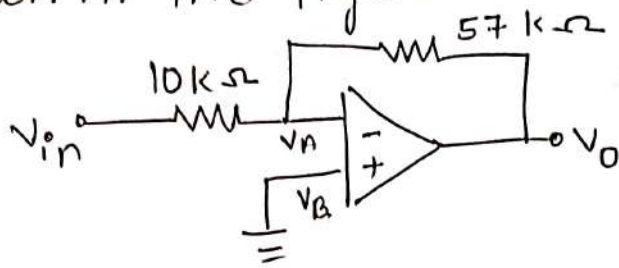
From the concept of virtual GND

$$V_B = V_A = 0V.$$

Apply KCL @ node A

$$\frac{V_{in} - V_A}{10k\Omega} = \frac{V_A - V_o}{57k\Omega}$$

$$V_A = 0V$$

$$\frac{V_{in}}{10 \times 10^3} = \frac{-V_o}{57 \times 10^3}$$

$$A = \frac{V_o}{V_{in}} = -\frac{57 \times 10^3}{10 \times 10^3}$$

$$\boxed{A = -5.7.}$$

④ what will be the voltage gain range for the circuit shown in figure.
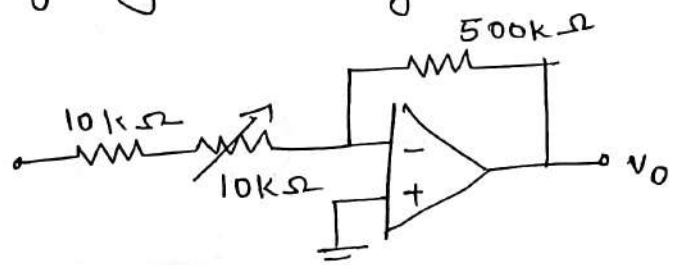
Soluⁿ

given data.

$R_1 = 10k\Omega$

$R_2 = 10k\Omega$ (variable)

$A = ?$ (range)

$R_f = 500k\Omega$

$$V_0 = \frac{-R_f}{(R_1 + R_2)} V_{in}$$

$$A = \frac{V_0}{V_{in}} = \frac{-R_f}{R_1 + R_2}$$

for $R_2 = 0\,\Omega$

$$A_1 = -\frac{500 \times 10^{+3}}{10 \times 10^3 + 10} = -50$$

for $R_2 = 10k\Omega$

$$A_1 = -\frac{500 \times 10^3}{10 \times 10^3 + 10 \times 10^3} = -25$$

The voltage gain is -25 to -50, $-ve$ sign

indicates phase shift b/w i/p & o/p.

⑤ Calculate the output voltage V_0 for the circuit shown in figure.

soluⁿ
given
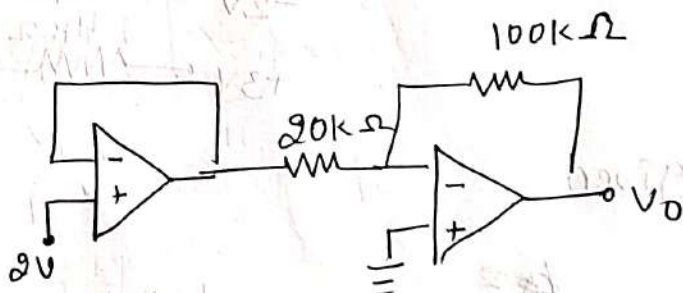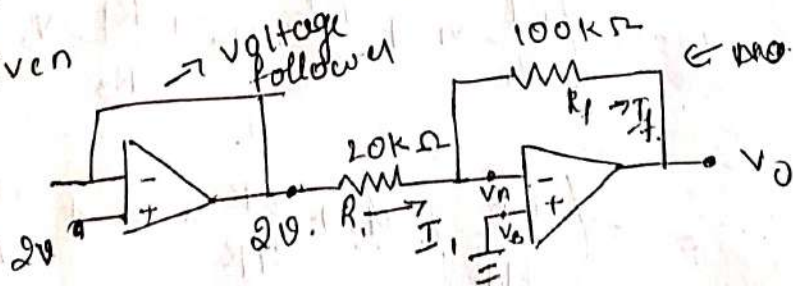
voltage follower ↗   100kΩ   ← non inverting amplifier

From the concept of virtual GND)

$V_B = V_A = 0V$.

Apply KCL @ Node A.

$$I_1 = I_f$$

$$\frac{2v - V_A}{20 \times 10^3} = \frac{V_A - V_0}{100 \times 10^3}$$

sub $V_A = 0$.

$$\frac{2v}{20 \times 10^3} = \frac{-V_0}{100 \times 10^3}$$

$$V_0 = - \frac{2 \times \overset{5}{\cancel{100}} \times 10^3}{\cancel{20 \times 10^3}}$$

$$V = -10v.$$

OR

$$V_0 = - \frac{R_f}{R_1} \times V_{in}$$

$$= - \frac{100 \times 10^3}{20 \times 10^3} \times 2$$

$$\boxed{V_0 = -10v.}$$

6) Find the output voltage of the 3-input adder ckt Shown in the figure.
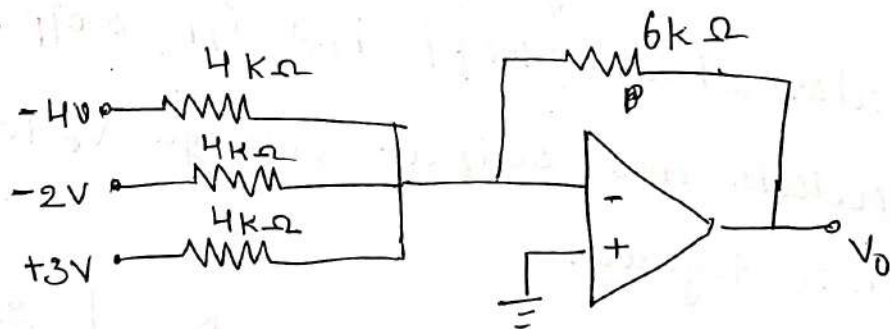
given

$R_f = 6k\Omega$

$R_1 = 4k\Omega$

$R_2 = 4k\Omega$

$R_3 = 4k\Omega$

$V_1 = -4v$

$V_2 = -2v$

$V_3 = +3v$

W.K.T

$$V_0 = - \left(\frac{R_f}{R_1} V_1 + \frac{R_f}{R_2} V_2 + \frac{R_f}{R_3} V_3 \right)$$

$$= - \left(\frac{\overset{3}{\cancel{6k}}}{\cancel{4k}_2} \times -4 + \frac{\overset{3}{\cancel{6k}}}{\cancel{4k}_2} \times -2 + \frac{\overset{3}{\cancel{6k}}}{\cancel{4k}_2} \times 3 \right)$$

$$= - (-6 - 3 + 4.5)$$

$$\boxed{V_0 = 4.5v}$$

7) Calculate the output voltage of the circuit shown in figure.
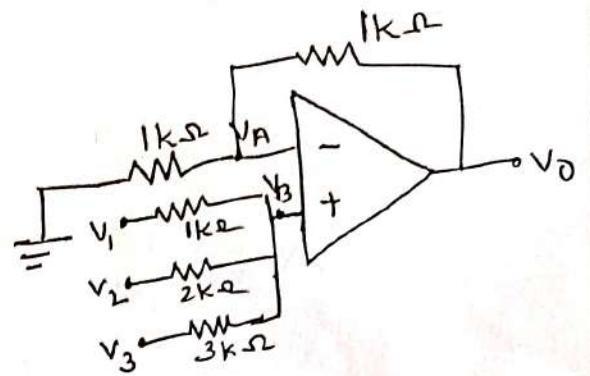
Apply KCL @ Node B.

$$I_1 + I_2 + I_3 = 0$$

$$\frac{V_1 - V_B}{1k} + \frac{V_2 - V_B}{2k} + \frac{V_3 - V_B}{3k} = 0 \qquad \begin{array}{l} V_1 = 1V \text{ ac to} \\ V_2 = 2V \\ V_3 = 3V. \end{array}$$

$$\frac{1 - V_B}{1k} + \frac{2 - V_B}{2k} + \frac{3 - V_B}{3k} = 0$$

$$\frac{6 - 6V_B + 6 - 3V_B + 6 - 2V_B}{6k} = 0$$

$$-11V_B + 18 = 0$$

$$V_b = \frac{18}{11}$$

~~App~~

$$V_0 = \left(1 + \frac{R_f}{R}\right) \times V_{in}$$

$$= \left(1 + \frac{1k}{1k\Omega}\right) \times \frac{18}{11}$$

$$= \cancel{1+1}$$

$$2 \times \frac{18}{11}$$

$$\boxed{V_0 = 3.29 \ V}$$

Module -5

Communication System

Block diagram of communication system.

Any electronic communication system can be represented in its basic form, as shown in fig(a)
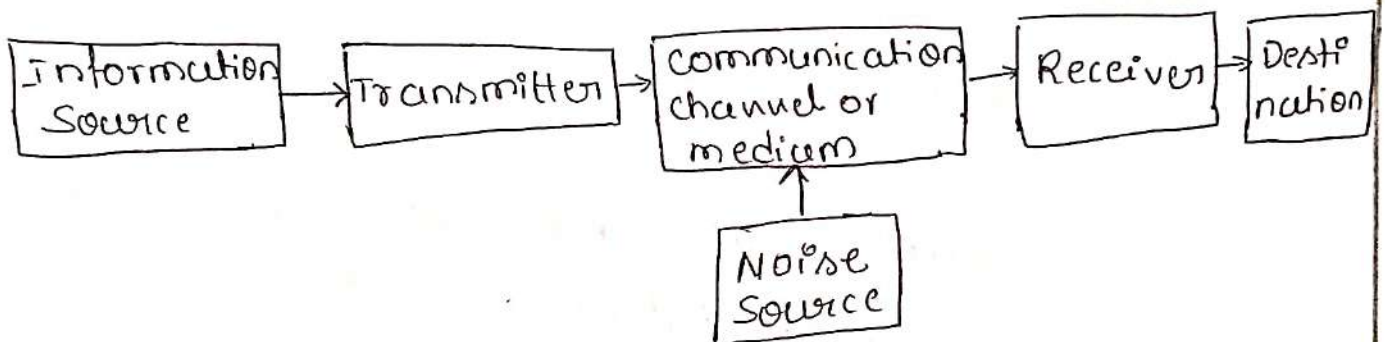
fig: Block diagram of communication system.

*)The basic components of communication systems are transmitter, a communication channel, & and a receiver. Noise is present in the channel and gets added to the information.

*) The Elements of communication system are as follows.

→ Information

→ Transmitter

→ communication channel or medium

→ Noise

→ Receiver.

Information.

* The communication systems communicate messages comes from information source.

* The two main sources
  → ideas from human
  → changes in the physical environment.

* messages are like voice, picture, code, data music and their combination.

Transmitter

* The transmitter is a collection of electronic ckt designed to convert the information into a signal suitable for transmission over a given communication medium.

* most of the information is non-electrical and it is not suitable for immediate transmission.

* The transducers, decoders, encoders ckt care used to convert information into electrical signal.

* Transmitter also has a built in amplifier ckt to amplify the information which help the proper receiver to transmission of information.

Communication channel.

* The communication channel is the medium by which the electronic signal is transmitted from one place to another.

* It can be pair of conducting wire, coaxial cable, optical fibre cable or free space.

Noise : Noise is random, undesirable or unwanted electric energy that enters the communication system via medium and interferes with the transmitted messages.

Receiver. : A receiver is a collection of electronic ckts designed to convert the signal back to the original information.

* It consists of amplifier filters, detector, etc.

Modulation.

~~Modulation~~ Base band communication.

* Analog signals can be converted into digital form and then transmitted.

* The original information signals are analog or digital are referred as baseband signals.

* The original signal directly transmitted over medium is called baseband transmission.
                    Ex: Telephony.

Limitations of bauband communication.

* baseband signals are more cannot travel longer distances in air, the signal gets attenuated rapidly
‹* Hence for transmission of baseband signals by radio, modulation technique has to be used›

What is modulation? what is demodulation?

» The process by which the baseband signal modifies the carrier signal is called modulation and the resultant signal is called modulated signal.

The process of seperating base band signal and carrier signal at the receiving end is called demodu -lation.

Note: In Electronic communication system, a high frequency signal called the carrier signal is used to transmit baseband signal to the destination.

Need for modulation.

* The base band signals are incompatible for direct transmission over the medium and therefore modulation technique for the communication of baseband signal.
*The advantages of using modulation technique are given below.

→ Reduces the height of antenna

→ Avoids mixing of signals

→ Increases the range of communication

→ Allows multiplexing of signals

→ Allows adjustments in the band width

→ Improves quality of reception.

Reduces the <u>height of antenna</u>.

* The height of the antenna required for transmission and reception of radio waves in radio transmission is a function of wavelength of the frequency used.

minimum height of the antenna is given as $\lambda/4$ where λ is given wavelength and it is given as

$$\lambda = \frac{c}{f}$$

where - c is the velocity of light
        f frequency.

For example,

consider base band signal with $f = 15 \, kHz$, Then

$$\text{Height of antenna} = \frac{\lambda}{4} = \frac{c}{f \times 4}$$

$$= \frac{3 \times 10^8}{15 \times 10^3 \times 4}$$

$$= 5000 \text{ meters}.$$

5000 meters hights of antenna is unthinkable and unpractical.

So if we consider a modulated signal with 1MH$_3$ frequency in the broadcast band,

$$\text{The heights of antenna} = \frac{\lambda}{4} = \frac{c}{f \times 4}$$

$$= \frac{3 \times 10^8}{1 \times 10^6 \times H}$$

$$= 75 \text{ meters.}$$

the height of antenna is practical and such antenna can be installed.

2) void mixing of signals.

→) All sound signals are concentrated within the range 20 H$_3$ to 20 KH$_3$.

*) The transmission of baseband signals from various sources causes the mixing of signal and it is very difficult to separated at the receiver end.

* To avoid this it is necessary to translate at different channel of electromagnetic spectrum shown in fig(a)

* each signal channel given its own bandwidth called channel bandwidth.
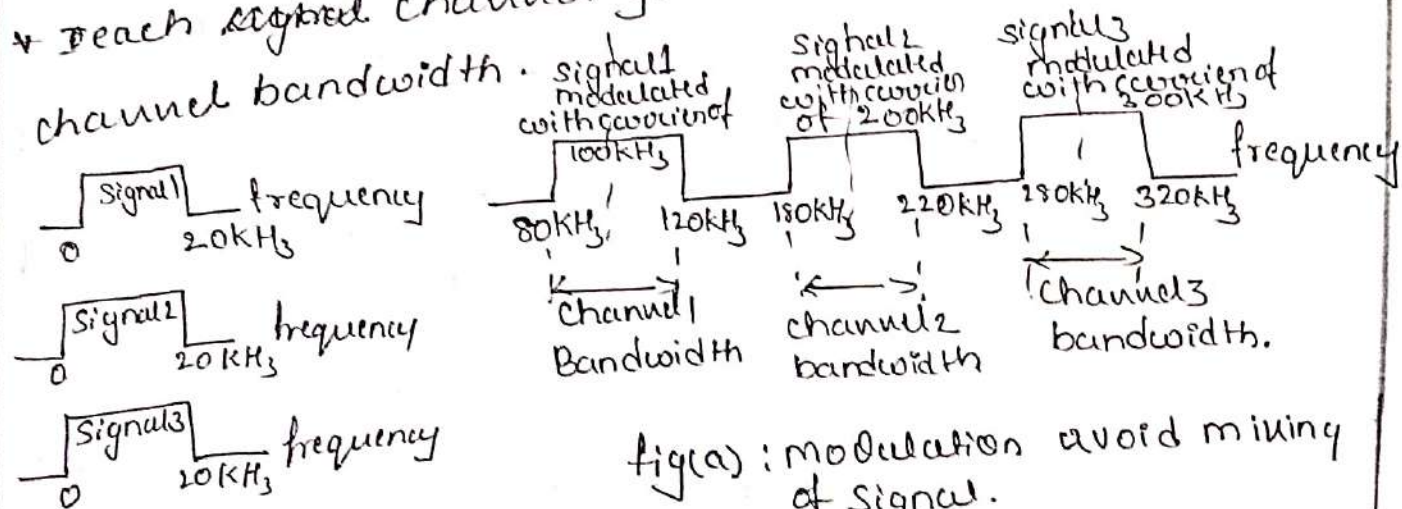
fig(a): modulation avoid mixing of signal.

3. Increases the range of communication.

· Baseband signal are incapable to transmit over long distance. Modulation effectively increases the frequency of the baseband signal so that It can be transmitted over long distance.

4. Allows multiplexing of signals.

Transm Modulation permits transmission of two or more signals simultaneously over the same channel. With the help of different carrier signal it can be separated at the receiver.

5. Allows adjustments in the bandwidth.

Noise is the function of bandwidth, so modulation allows to change the bandwidth of modulated signal to protect from noise.

6. Improves quality of reception.

The communication system using modulation methods reduce the effect of noise at receiver.

Modulation Technique.

Type of modulation.

Analog (continuous curve modulation) → Amplitude modulation, Angle modulation

Amplitude modulation → frequency modulation

Angle modulation → phase modulation

Pulse modulation → digital modulation, Analog modulation

digital modulation → pulse code modu-lation

Analog modulation → PAM, PDM, PPM
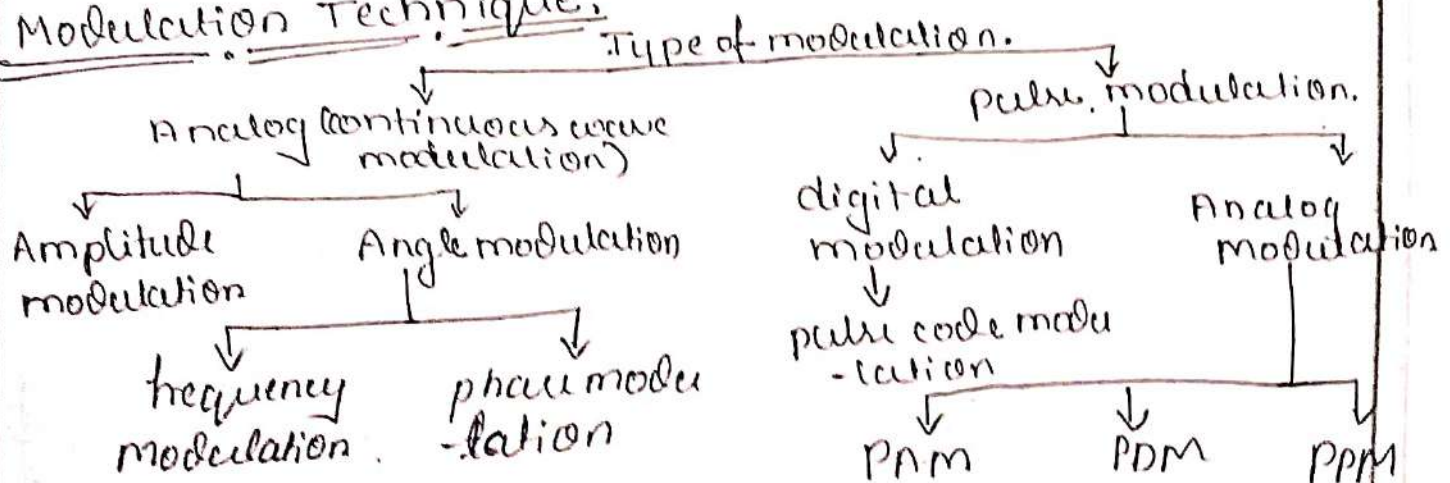
Amplitude Modulation

In Amplitude modulation, Amplitude of carrier Signal changes off in accordance with the amplitude of modulating (baseband) signal by keeping frequency and phase of the carrier signal as constant.

fig(a) shows the baseband signal, high frequency carrier signal and modulated signal.

* In modulation process the frequency of carrier signal remains constants only amplitude varies in accordance with the mode baseband signal.

Baseband Signal

carrier Signal

amplitude modula - ted Signal.

maximum amplitude
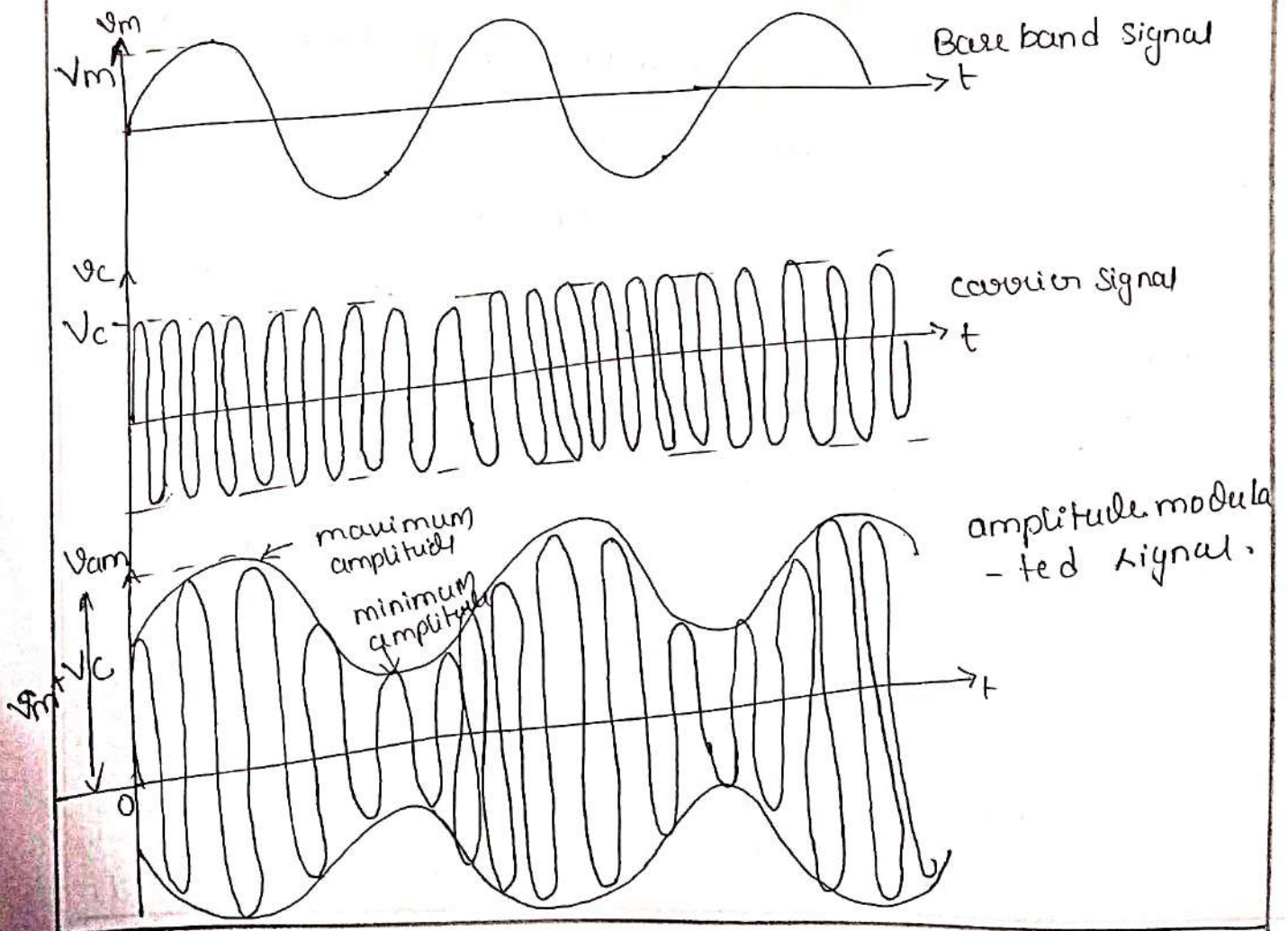
minimum amplitude

Expression for AM.

Derive the expression for AM wave

The instantaneous values of modulating (base band) signal and carrier signal is given by

$$V_m = V_m \sin \omega_m t \longrightarrow \text{①} \quad \text{for modulating S/l}$$

where
V_m = instantaneous amplitude
V_m = Maximum amplitude
$\omega_m = 2\pi f_m$ = Angular frequency &
f_m = frequency of baseband signal.

$$V_c = V_c \sin \omega_c t \longrightarrow \text{②} \quad \text{for carrier S/l.}$$

where
V_c = instantaneous amplitude
V_c = maximum amplitude
$\omega_c = 2\pi f_c$ = Angular frequency &
f_c = frequency of carrier signal.

instantaneous value of amplitude modulated signal is given by

$$V_{AM} = V_c + V_m$$
$$= V_c + V_m \sin \omega_m t \qquad \because V_m = V_m \sin \omega_m t$$
$$\therefore V_{AM} = V_{AM} \sin \omega_c t$$

$$V_{Am} = (V_c + V_m \sin \omega m t) \sin \omega c t \longrightarrow \text{③}$$

modulation index:

It is the ratio of amplitude of modulating signal to amplitude of carrier signal. it is deno -ted by m.

i.e. $m = \dfrac{V_m}{V_c}$

Problem 1 : calculate the modulation index and percentage of modulation if instantaneous voltage of modulating signal and carrier are $40 \sin \omega m t$ & $50 \sin \omega c t$, respectively.

$V_m = 40 \sin \omega m t$

$V_c = 50 \sin \omega c t$

$V_m = 40$

$V_c = 50$

$m = \dfrac{V_m}{V_c} = \dfrac{40}{50} = 0.8 \Rightarrow 80\%$

Define modulation index interms of Vmax & Vmin.
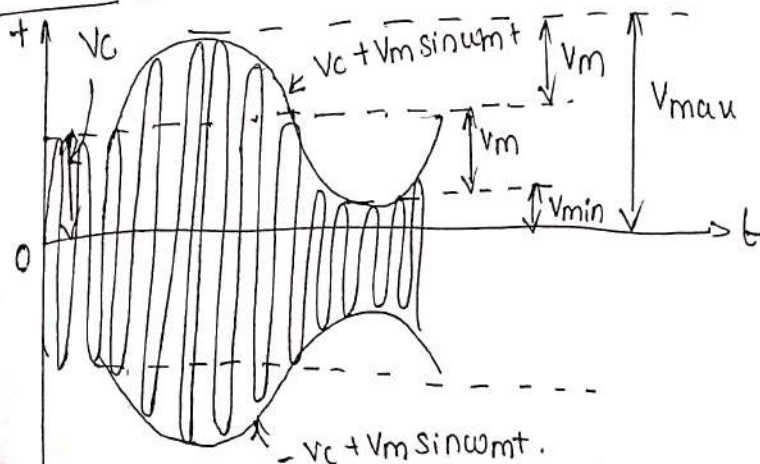
Looking at fig we can write.

$$2V_m = V_{max} - V_{min}$$

$$V_m = \frac{V_{max} - V_{min}}{2} \longrightarrow ①$$

and

$$V_c = V_{max} - V_m \longrightarrow ②$$

Substitute eqtⁿ ① in eqtⁿ ②

$$V_c = V_{max} - \left[\frac{V_{max} - V_{min}}{2}\right]$$

$$= \frac{2V_{max} - V_{max} + V_{min}}{2}$$

$$V_c = \frac{V_{max} - V_{min}}{2} \longrightarrow ③$$

W.K.T

$$m = \frac{V_m}{V_c} \longrightarrow ④$$

Sub eqtⁿ ① & ③ in ④

$$m = \frac{V_{max} - V_{min}}{2} \times \frac{2}{V_{max} + V_{min}}$$

$$\boxed{m = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}}$$

Frequency Modulation.

In frequency modulation, the frequency of carrier wave signal varies in accordance with the modulating signal, by keeping amplitude and phase of carrier wave signal remains constant.

waveform of frequency modulation.

The waveform of FM is shown in fig (a).

fig(a).

modulating signal.

carrier signal

frequency modulated wave.

maximum frequency

minimum frequency.

*) The amount of changes in carrier frequency produced by the modulating signal is known as frequency deviation.

* Max frequency deviation occurs at the max amplitude of the modulating signal shown in fig (a)
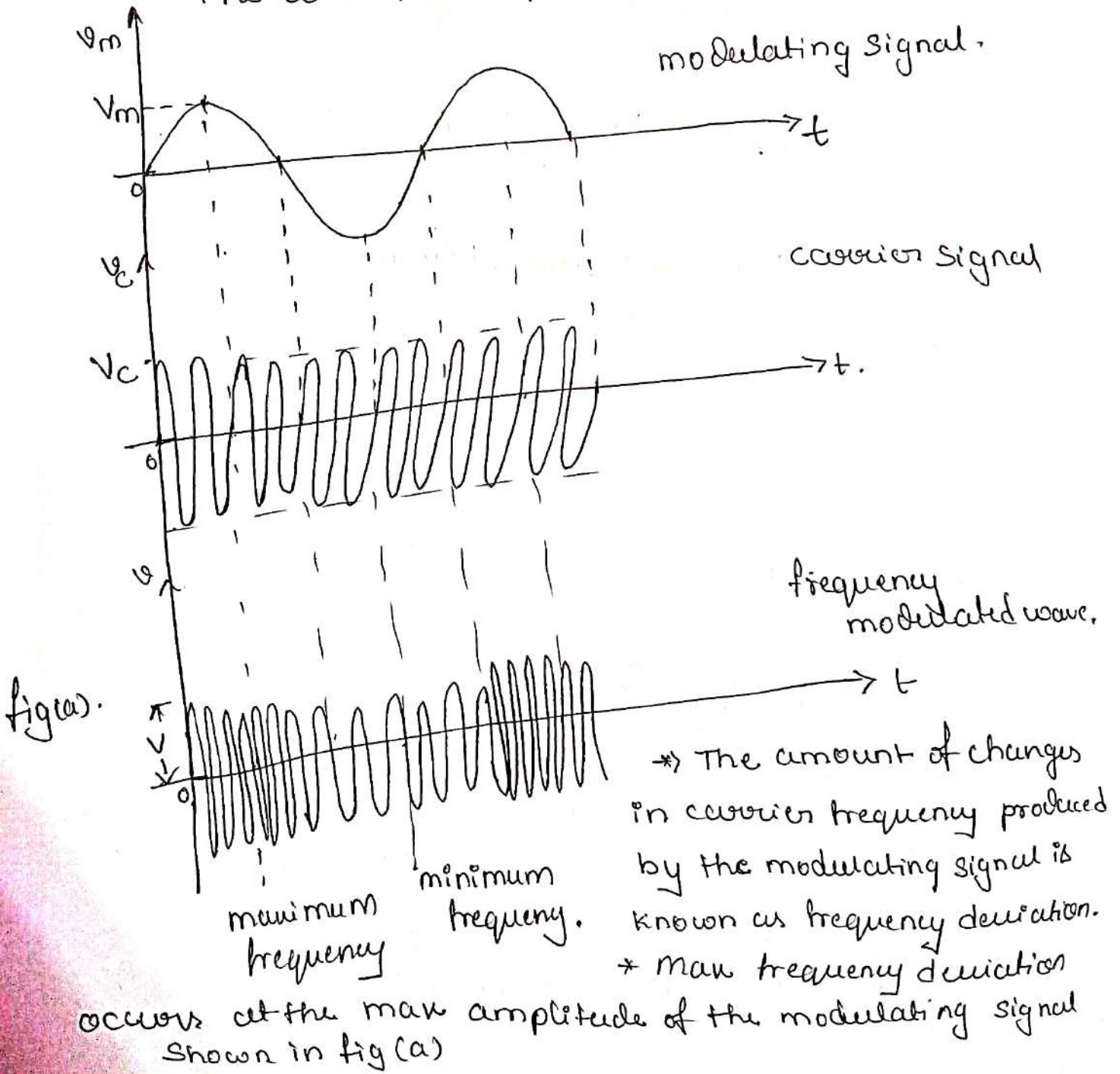
The expression for FM wave is given by

$$v = A \sin\left[w_c t + \frac{\Delta f}{f_m} \sin w_m t\right]$$

$$= A \sin\left[w_c t + m_f \sin w_m t\right]$$

where

$$w_c = 2\pi f_c \quad , \quad w_m = 2\pi f_m$$

Δf = frequency deviation

A = Amplitude of FM signal

m_f = modulating index of FM.

Modulation Index of FM

Modulation index of FM signal is the ratio of the frequency deviation to the modulating frequency.

$$m_f = \text{modulation index} = \frac{\text{frequency deviation}}{\text{modulating frequency}}$$

$$\boxed{m_f = \frac{\Delta f}{f_m} = \frac{\delta}{f_m}}$$

Principle of operations of Mobile Phone.

*) A cellular/mobile system provides standard Telephone operation by full duplex, two way radio at remote locations.

*) It provides a wireless connection to the public Switched Telephone network (PSTN) from any user location within the radio range of the system.

*) The basic concept of cellular radio slm is, The System divides the service area into many small area known as cells. Shown in fig(a).

*) each cell have its own receiver and low-power Transmitter.
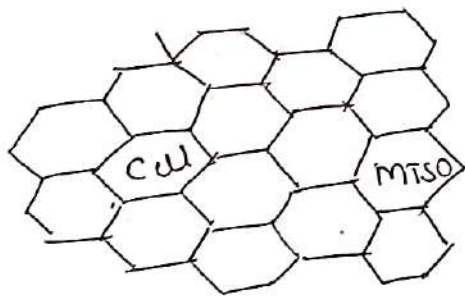
*) Basic cellular slm consists of mobile stations, base stationn and a mobile Switching center (MSC).

*) MSC in also known as Mobile Telephone Switching office (MTSO).

* The MTSO controls all the cells and provides the interface between each cell and the main telephone office.

* Each mobile communicates with one of the base Stations

* mobile statation has many transsceiver, antenna and control unit.circuitry.

* Base station act as bridge b/w all mobile users & MSC.

* MSC co-ordinates all activities of base station.
* cellular sim also provides service known as roaming.

mobile communication system.

fig(a) shows the block diagram of a cellur mobile radio unit
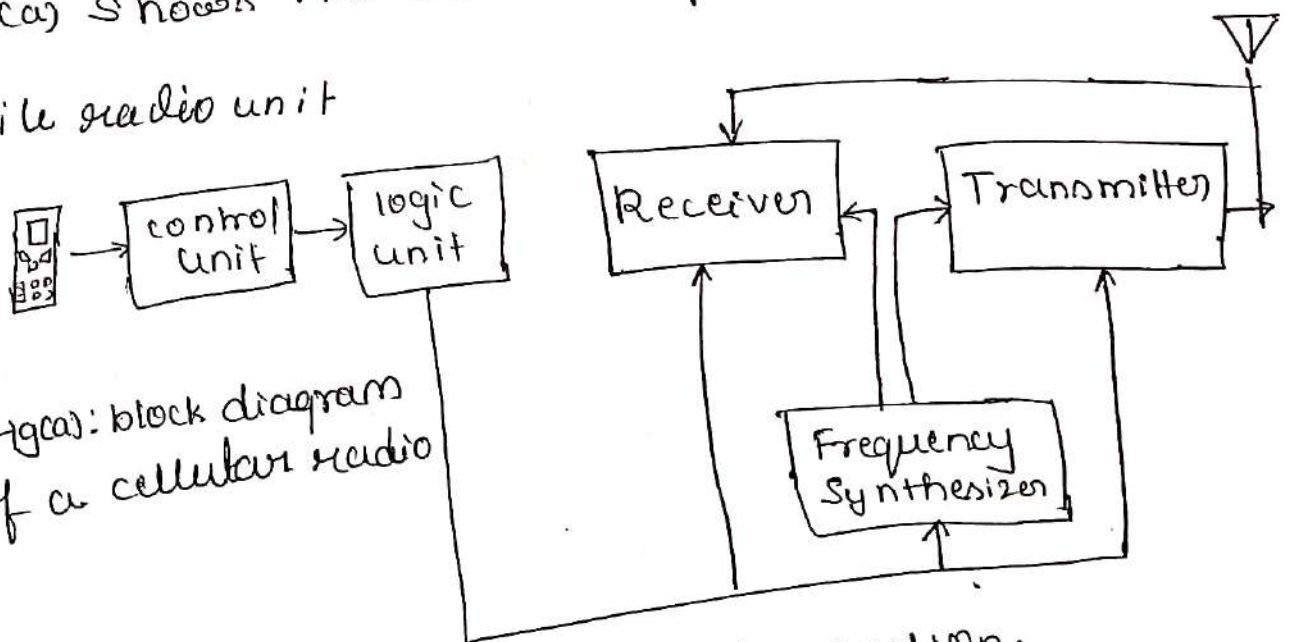
fig(a): block diagram of a cellular radio

The unit consists of 5 major section:
→ transmitter
→ Receiver

→ Synthesizer

→ logic unit &

→ Control unit.

* Transmitter and receiver in the unit share the common antenna.

Transmitter.

* fig(b) Shows the block diagram of cellular transmitter.

*) It is low power FM transmitter operating in the frequency range of 825 to 845 MHz.

*)
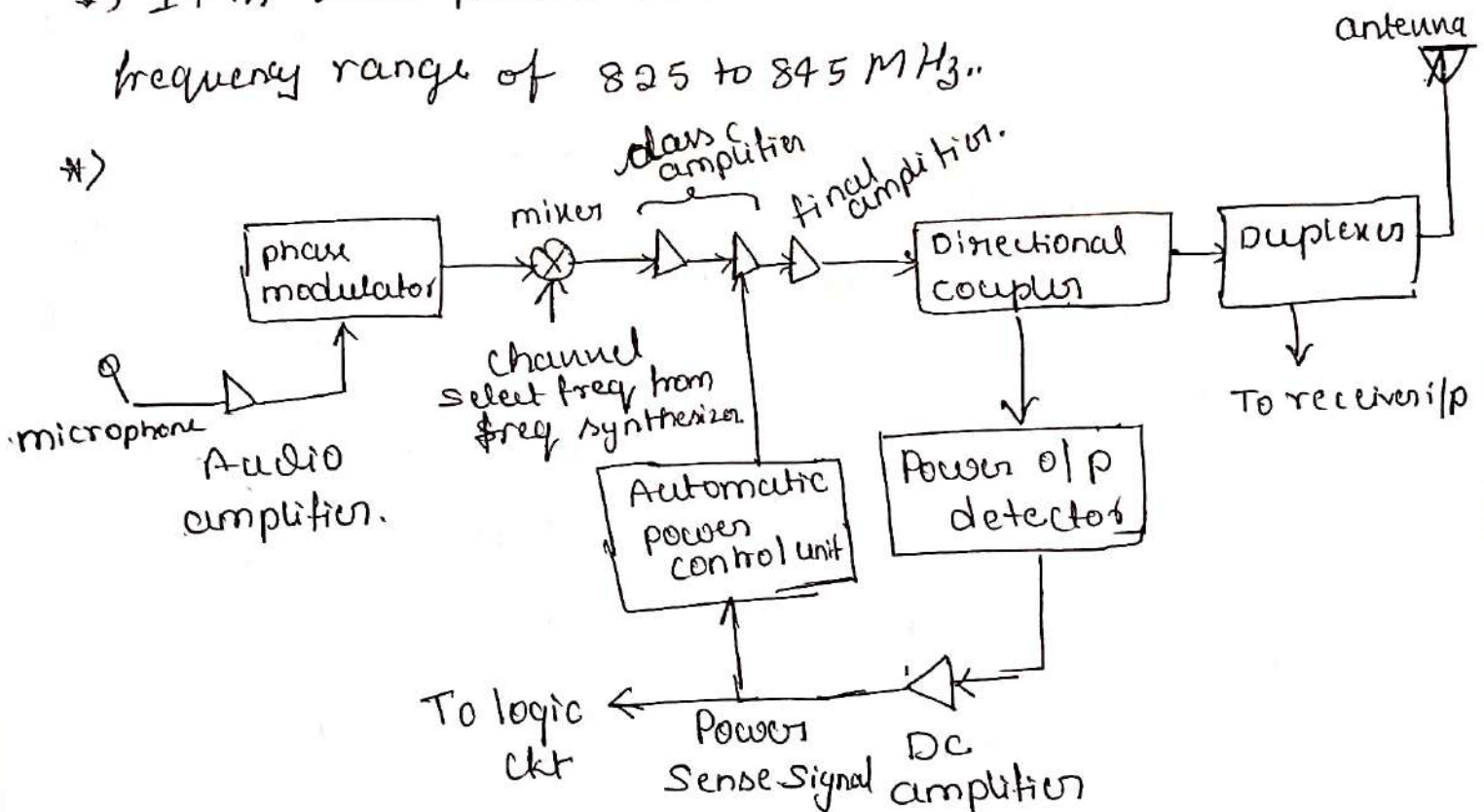
fig (b):- Block diagram of cellular Transmitter.

* phase modulator modulates the preamplified voice signal and the carrier i/p from the frequency synthesizer.

* The modulated o/p is translated up to final transmitter frequency with the help of mixer whose second i/p also comes from the frequency synthesizer.

* The mixer o/p is fed to class C power amplifier & final amplifier, which amplifies the signal to required level for transmission.

* An automatic Power Control (APC) ckt the transmitter to one of 8 power output levels.

* The directional coupler samples the transmitter o/p power and rectifies it into a proportional d.c. signal.

* This signal is used in the APC ckt and is transmitted back to the cell site permitting the MTSO to know the present power level.

* The transmitter o/p is then fed to a duplexer or isolator.

* isolator helps allows the transmitter and drecei-ven to share the same antenna.

Receiver of Mobile communication.
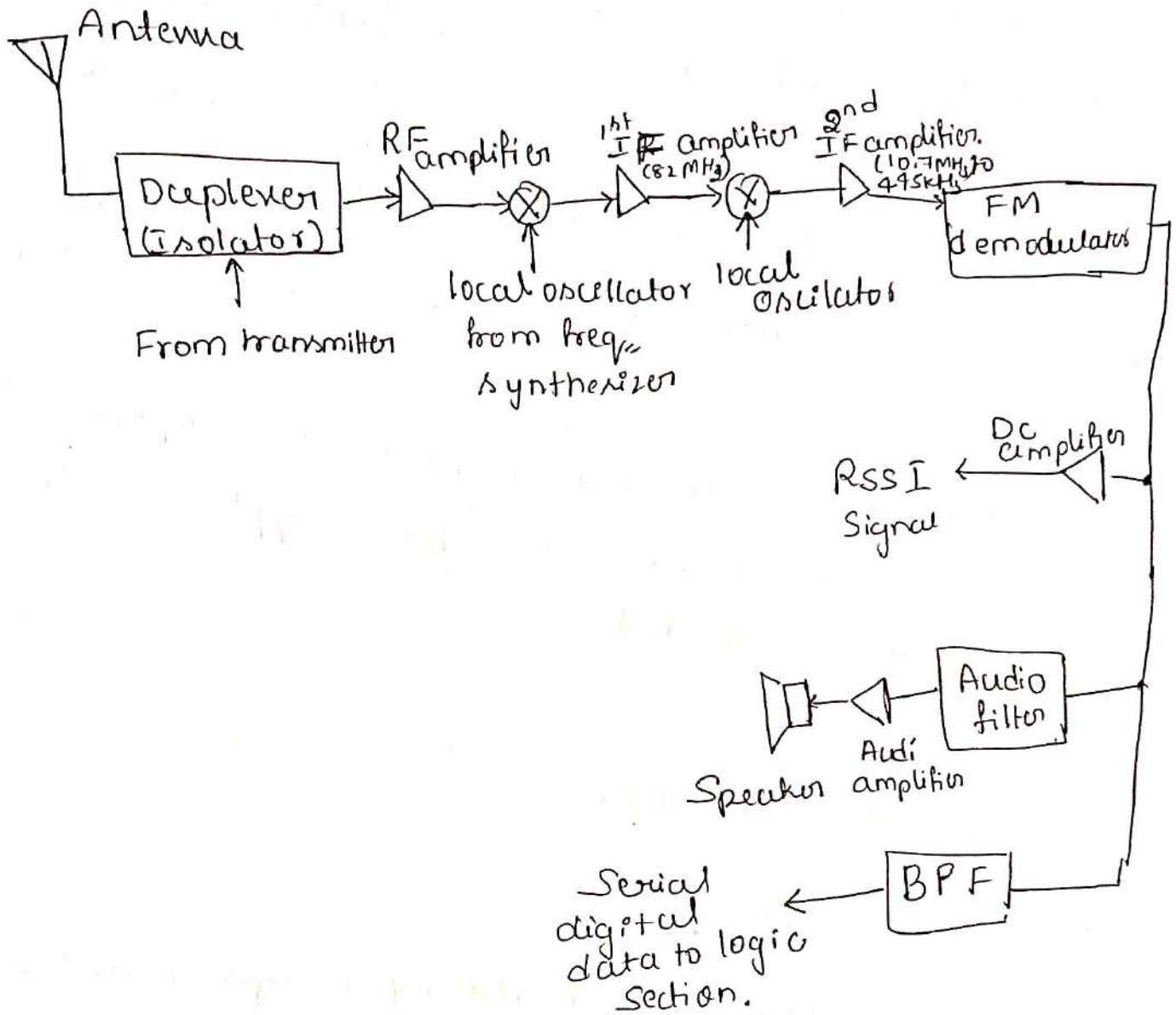
fig (c): Block diagram of cellular receiver.

* fig(c) shows the block diagram of cellular

receiver.

* In cellular phone dual-conversion superheterodyne

receiver is used.

* An AF amplifier boots the level of the received

Signal.

*) 1st mixer translates the incomming signal to

1st IF. The local oscillator frequency is derived

from the frequency synthesizer. The local
oscillator frequency sets the receiver channel.

* The signal from o/p of mixer is amplified by an IF amplifier and then passed to the second IF.

* 2nd IF is controlled by crystal controlled local oscillator.

* The signal is then demodulated, de-emphasized filtered and amplified before being applied to the o/p speaker in the handset.

Microwave Communication.

what is microwave.

Is a signal having frequency ranges from 300 MHz to 300 GHz or wave length ranges from 1m to 1mm in the electromagnetic spectrum.

This band of frequencies is called as Microwave frequency band, which is further divided into three bands-

    UHF (ultra high frequency) band 300 MHz to 3GHz
    SHF (super high frequency) band 3GHz to 30GHz
    EHF (extra high frequency) band 30GHz to 300GHz

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TRANSFORMERS

TRANSFORMER is a static device which transfer Electric energy from one Circuit to another Circuit without any Change in frequency.

The basic use of a transformer is to increase or decrease the AC Voltage.

* Transformer used to increase the voltage is Called Step up transformer.

* Transformer used to decrease the Voltage is Called Step down transformer.

July 10, 08
09, 03

Jan 03
08

* Principle of Operation :-

Primary [P] ←   → Secondary [S]
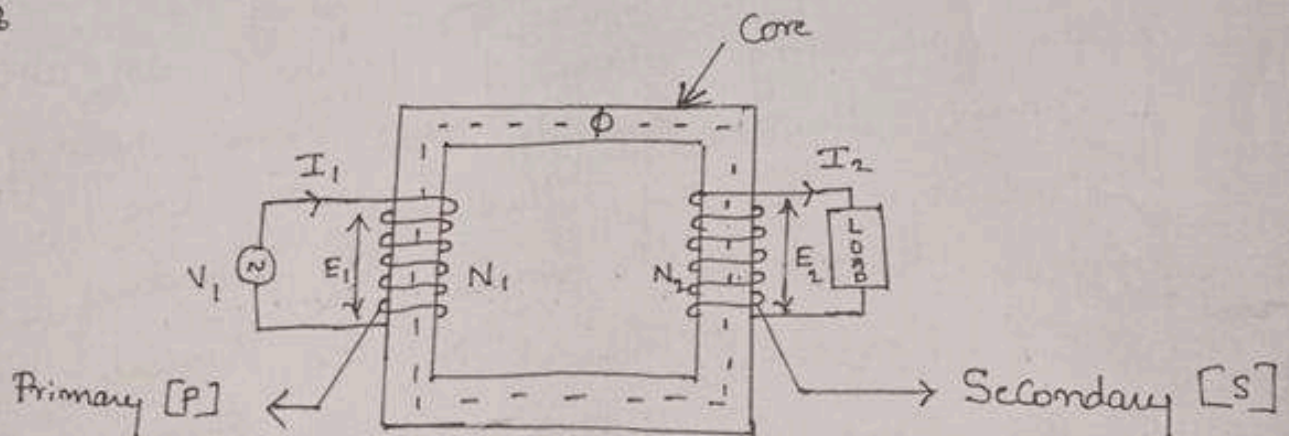
General Construction :-

* A Single phase transformer basically consists of two parts 1) Core
                                                              2) Windings

* The vertical portions of the core are termed *
* The top & bottom portions are called Yo
* The two coils P & S having N_1 & N_2
  are wound on the limbs.
* The Winding which is connected to the Sup
  is called primary winding [P] & the wind
  which is connected to the Load is called Se
  -ary winding [S].

Working Principle :-

A transformer operates on the principle c
Mutual induction.

When the primary winding is connected to
an alternating voltage of V_1 Volts, an alternatin
Current flows through the primary winding & it
Produces alternating flux in the core. When th
flux links both primary & secondary winding
an Emf E_1 induced in the primary winding.
an Emf E_2 induced in the secondary winding.
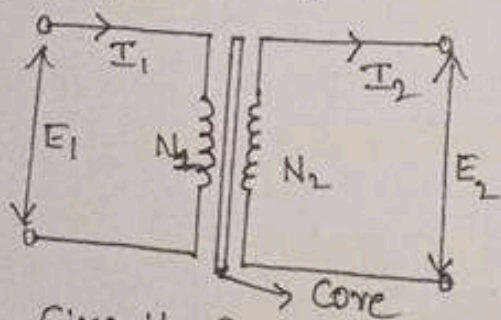
Circuit Symbol of a transformer

EMF Equation Of Transformer :-
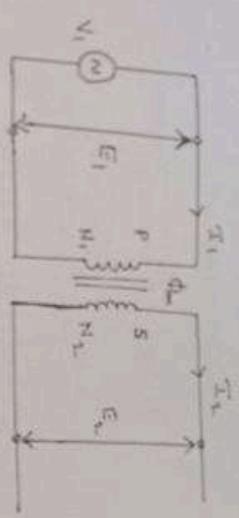
Consider a sinusoidally varying voltage V_1 applied to the primary of the transformer as shown in the above fig. Due to this voltage a sinusoidally varying magnetic flux is setup in the core, which is given by

$$\phi = \phi_m \sin \omega t \longrightarrow ①$$

$\phi_m \rightarrow$ Peak value of the flux.

As per the law of electromagnetic induction, the emf induced in a winding of N turns is given by

$$e = -N \frac{d\phi}{dt} \longrightarrow ②$$

Substitute eqn ① in ② , we get

$$e = -N \frac{d}{dt} [\phi_m \sin \omega t]$$

$$e = -N\phi_m \frac{d}{dt}[\sin \omega t]$$

$$= -N\omega\phi_m \cos \omega t$$

$$= N\omega\phi_m \times [-\cos \omega t]$$

$$= \omega N\phi_m \times [\sin(\omega t - \pi/2)]$$

$$e = 2\pi f N\phi_m \sin(\omega t - \pi/2)$$

e is Maximum When $\sin(\omega t - \pi/2) = 1$

$$\therefore E_m = 2\pi f N\phi_m$$

But $E_{rms} = E = \dfrac{E_m}{\sqrt{2}}$

$$E = \frac{2\pi f N\phi_m}{\sqrt{2}}$$

$$= \frac{\sqrt{2}\sqrt{2}\pi f N\phi_m}{\sqrt{2}}$$

$$= \sqrt{2}\pi f N\phi_m$$

$$\boxed{E = 4.44 f N\phi_m}$$

This eqn is known as <u>emf eqn of transformer.</u>

* The emf induced in the primary winding is

$$\underline{E_1 = 4.44 f N_1 \phi_m}$$

* The emf induced in the Secondary winding

  is $\quad \underline{E_2 = 4.44 \, f \, N_2 \, \phi_m}$

Transformation ratio or turns ratio :-

The ratio of Secondary voltage to primary Voltage is known as transformation ratio.

It is denoted by K.

$$\therefore \quad K = \frac{\text{Secondary Voltage}}{\text{Primary Voltage}}$$

$$K = \frac{E_2}{E_1} \longrightarrow ①$$

$$= \frac{4.44 \, f \, N_2 \, \phi_m}{4.44 \, f \, N_1 \, \phi_m}$$

$$K = \frac{N_2}{N_1} \Longrightarrow \underline{\text{turns ratio}} \longrightarrow ②$$

From eqn ① & ②

$$\boxed{K = \frac{E_2}{E_1} = \frac{N_2}{N_1}} \longrightarrow ③$$

For ideal transformer,

I/p Power = O/p Power

$$E_1 I_1 = E_2 I_2$$

5

$$\therefore \boxed{\frac{E_2}{E_1} = \frac{I_1}{I_2}} \longrightarrow ④$$

From equ ③ & ④, we get

$$\boxed{K = \frac{E_2}{E_1} = \frac{N_2}{N_1} = \frac{I_1}{I_2}}$$

Note :-

1) When $K > 1$ $[ie~N_2 > N_1]$

$$E_2 > E_1$$

The device is known as <u>Step-up transform</u>

2) When $K < 1$ $[ie~N_2 < N_1]$

$$E_2 < E_1$$

The device is known as <u>Step-down transfor</u>

3) When $K = 1$ $[ie~N_2 = N_1]$

$$E_2 = E_1$$

The device is known as <u>One : one</u>
<u>transformer</u>

* Types of Transformers :- [July 08 . July 07 . July 03]

Depending upon the Construction of the Core the transformers are classified into 2 types.

1) Core type transformer
2) Shell type transformer

* 1) Core type transformers :
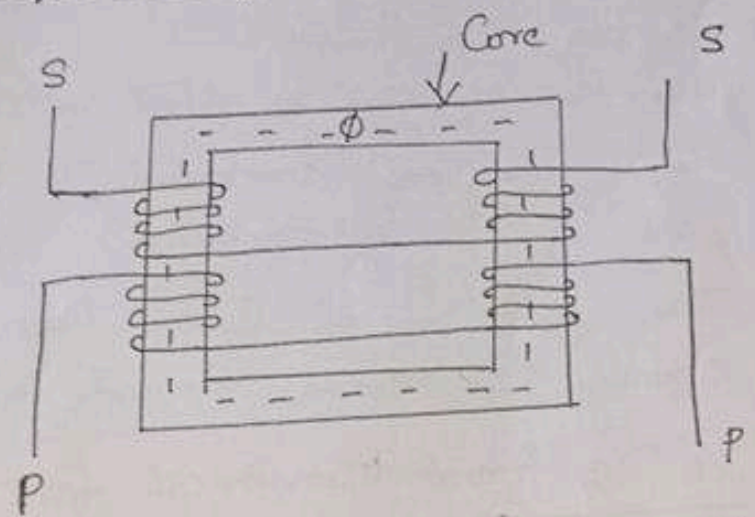
* In this type, the windings surround a Cons:- -durable part of the Core.

* Both the windings are divided into two equal parts & half of Each winding is placed on each limb side by side. This is done to reduce the Leakage of flux.

* In this type, the flux has single path.

* It is preferred for high Voltages.

* Shell type transformer:
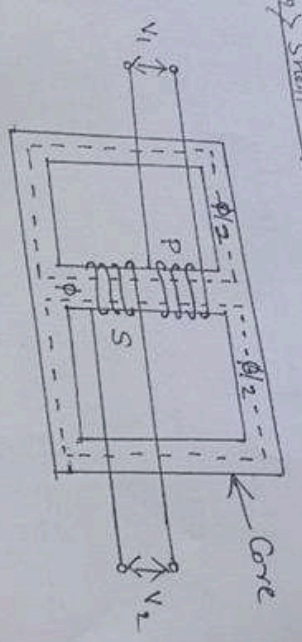
* It has three limbs.
* Both the windings are placed on the central limb.
* Here, the core surrounds a considerable part of the windings.
* The flux in the central limbs divides equally & returns through the outer two legs.
* It is more economical for low voltages.

* Ideal Transformer :-

The transformer which has no power losses can be called as **Ideal transformer**.

Conditions for Ideal transformer :

* The core has no losses.
* The resistance of its winding is zero, hence no I^2R losses in the windings.
* There is no leakage flux

* Efficiency of an ideal transformer is 100%.
    But in practical transformers, power is
dissipated in the windings, core & surrounding
structures.

    ∴ Efficiency of the practical transformer
is less than 100%.

* Losses : [Jan 09, July 08, Jan 10, Jan 08, Jan 07, July 07, Feb 05]
                There are two types of Power Losses -
occur in a transformer.

    1> Copper loss / I^2R loss.
    2> Iron loss / Core loss.

1> Copper loss / I^2R loss [P_c] :-
    * This is the power loss that occurs in the
    Primary & secondary winding.

    * Windings are made of copper wire. Each
    winding has some resistance.

    * Power is wasted in the form of heat due t
    the resistance of the windings. This loss
    is called copper loss.

    $I_1^2 R_1 \rightarrow I^2R$ loss in the primary winding.
    $I_2^2 R_2 \rightarrow I^2R$ loss in the secondary winding.

9

$$\therefore \quad P_c = I_1^2 R_1 + I_2^2 R_2$$

$$P_c = I_1^2 R_{01}$$

$$P_c = I_2^2 R_{02}$$

Where $I_1 \rightarrow$ Current in the primary.

$I_2 \rightarrow$ Current in the secondary.

$R_{01} \rightarrow$ Total resistance as reffered to primary.

$R_{02} \rightarrow$ Total resistance as reffered to Secondary.

Copper Loss is proportional to the load & hence it is called <u>Variable Loss</u>.

2) <u>Core Loss / Iron Loss $[P_i]$</u> :-

Since the Core losses occur in the iron Core, there are also called iron losses.

Iron loss is further classified into two other losses.

    A. Eddy Current Loss

    B. Hysterisis Loss

A. <u>Eddy Current loss $[P_e]$</u> :-

Time Varying Current flowing through the Primary winding produce time Varying flux in the Core. This induces the Current in the core, which flows in a Circular path in the Core. This Circular