

CBCGS SCHEME

BESCK104B / BESCKB104

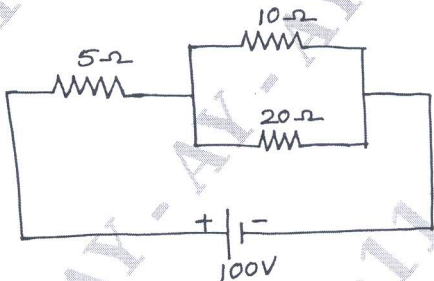
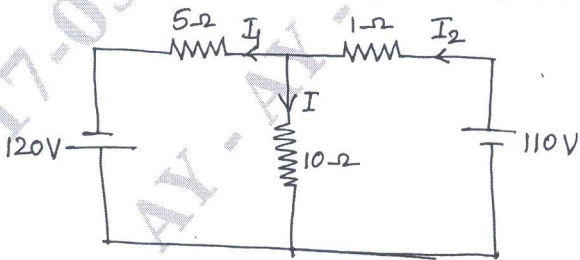
**First Semester B.E./B.Tech. Degree Supplementary Examination,
June/July 2024**

Introduction to Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks, L: Bloom's level, C: Course outcomes.*

| | | Module - 1 | M | L | C |
|-----------|----|---|----|----|-----|
| Q.1 | a. | Explain the general structure of electrical power system using single line diagram approach. | 06 | L2 | CO5 |
| | b. | Find the current and power in each resistor for the circuit shown in Fig.Q1(b). <div style="text-align: center;">  <p>Fig.Q1(b)</p> </div> | 06 | L3 | CO2 |
| | c. | Explain the operation of Nuclear power generation plant with the help of block diagram. | 08 | L2 | CO1 |
| OR | | | | | |
| Q.2 | a. | State and explain Kirchoff's laws. | 06 | L2 | CO1 |
| | b. | Distinguish between conventional and nonconventional sources of energy. | 06 | L3 | CO1 |
| | c. | Find the current I_1 , I_2 and I in the network shown in Fig.Q2(c). <div style="text-align: center;">  <p>Fig.Q2(c)</p> </div> | 08 | L3 | CO2 |
| | | Module - 2 | | | |
| Q.3 | a. | Define the following terms: (i) Average value (ii) RMS value (iii) Phase difference (iv) Amplitude | 06 | L1 | CO2 |

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|--|----|--|----|----|-----|
| | b. | A pure inductor excited by sinusoidal varying AC voltage, show that the average power consumed by inductor is zero. Also draw the voltage, current and power waveforms. | 08 | L2 | CO2 |
| | c. | A star connected load consists of 6Ω resistance and 8Ω inductive reactance in each phase. A supply of 440 V at 50 Hz is applied to the load. Find the line current, power factor and power consumed by the load. | 06 | L3 | CO2 |

OR

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|-----|----|--|----|----|-----|
| Q.4 | a. | Develop an equation for the power consumed by an RC series circuit. Draw the waveforms of voltage, current and power. | 08 | L2 | CO2 |
| | b. | What are the limitations and advantages of three phase system? | 06 | L3 | CO2 |
| | c. | A circuit consists of resistance 10Ω , an inductance of 16 mH and a capacitance of $150\ \mu\text{F}$ connected in series. A supply of 100 V at 50 Hz is given to the circuit. Find the current, power factor and power consumed. | 06 | L3 | CO2 |

Module – 3

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|-----|----|---|----|----|-----|
| Q.5 | a. | With the help of neat diagram, explain the construction of D.C generator. | 08 | L2 | CO3 |
| | b. | Give the classification of DC generator. Obtain the expression for EMF equation of a DC generator. | 06 | L2 | CO4 |
| | c. | A four pole d.c. shunt motor takes 22.5 Amps from a 250 V supply, $R_a = 0.5\ \Omega$ and $R_{sh} = 125\ \Omega$. The armature is wave connected with 300 conductors. If the flux per pole is 0.02 wb, calculate: (i) The speed (ii) Torque developed (iii) Power developed | 06 | L3 | CO4 |

OR

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|-----|----|--|----|----|-----|
| Q.6 | a. | What is back emf in a dc motor? What is its significance? | 06 | L1 | CO4 |
| | b. | Sketch N-I and T-I characteristics of DC: (i) Series (ii) Shunt motors. Mention two applications of each motor. | 08 | L4 | CO4 |
| | c. | A 8 pole wave wound DC shunt generator has 36 slots, 10 conductors in each slot. The flux/pole is 0.01 wb. It runs at 1200 rpm. The armature and field resistance are $0.1\ \Omega$ and $100\ \Omega$ respectively. Calculate the terminal voltage when the load current is 120 A. Neglect armature reactions. | 06 | L3 | CO4 |

Module – 4

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|-----|----|---|----|----|-----|
| Q.7 | a. | Discuss various types of losses in a transformer. | 08 | L2 | CO4 |
| | b. | With neat sketch, explain the construction and working principle of 1ϕ transformer. | 06 | L2 | CO3 |
| | c. | A 3 phase induction motor with 4 poles is supplied from an alternator having six poles and running at 1000 rpm. Calculate: (i) Synchronous speed of the IM (ii) Its speed when slip is 0.04 (iii) Frequency of the rotor emf when the speed is 600 rpm | 06 | L3 | CO4 |

OR

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|-----|----|---|----|----|-----|
| Q.8 | a. | With relevant diagram, explain the construction of three phase induction motor. | 08 | L2 | CO3 |
| | b. | Define slip of a 3-phase induction motor and derive the relation between supply frequency and rotor current frequency. | 06 | L2 | CO4 |
| | c. | The primary winding of a 25 KVA transformer has 200 turns and is connected to 230 volts, 50 Hz supply. The secondary turns are 50. Calculate: (i) No load secondary induced emf (ii) Full load primary and secondary currents (iii) The flux density in the core, if the cross section of the core is 60 cm ² . | 06 | L3 | CO4 |

Module – 5

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|-----|----|---|----|----|-----|
| Q.9 | a. | Mention the different types of wiring with relevant circuit diagram and switching tables, explain two-way and three way control of lamps. | 08 | L2 | CO5 |
| | b. | Define tariff. Explain briefly the two part tariff with its advantages and disadvantages. | 06 | L2 | CO5 |
| | c. | Explain the working principle of fuse and MCB. | 06 | L2 | CO5 |

OR

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|------|----|--|----|----|-----|
| Q.10 | a. | What is earthing? Why earthing is required? With the help of neat sketch, explain plate earthing. | 08 | L2 | CO5 |
| | b. | Write a short note on precautions against an electric shock. | 06 | L2 | CO5 |
| | c. | List out the power rating of household appliances including air conditioners, PCs, Laptops, printers etc. Find the total power consumed. | 06 | L2 | CO5 |
