

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

B.Tech. I Year II Semester Regular Examinations, June 2026

INTRODUCTION TO ELECTRICAL ENGINEERING

(Common to ECE & EVL)

Time: 3 hours

Max. Marks: 60

Answer ALL questions in PART-A.

Answer any ONE question from each unit in PART-B.

PART-A

5X2=10M

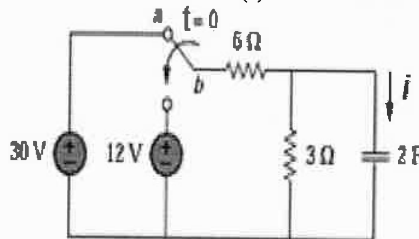
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|---|----|------|------|
| a) Express the time constant of R-C and R-L series circuit with DC excitation | 2M | CO-1 | BL-1 |
| b) Define coefficient of coupling in a coupled coil | 2M | CO-2 | BL-1 |
| c) List transformer losses. | 2M | CO-3 | BL-1 |
| d) Explain principle of operation of a dc motor | 2M | CO-4 | BL-2 |
| e) Define slip in induction motor. | 2M | CO-5 | BL-1 |

PART-B

5X10=50M

UNIT-I

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|---|--|----|------|------|
| 1 | a) Derive the transient response of a series R-L circuit with dc input. Sketch the variation of current and of the voltage across the inductor | 5M | CO-1 | BL-1 |
| | b) The switch has been in position A for a long time as shown in figure At $t=0$ it moves to position B . Calculate $i(t)$ for all $t>0$. | 5M | CO-1 | BL-2 |



OR

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|---|--|----|------|------|
| 2 | a) An RL series circuit is excited by a sinusoidal source of $v(t) = V_m \sin \omega t$ volts, by closing the switch at $t = 0$. Determine the current $i(t)$ flowing through the RL circuit? | 5M | CO-1 | BL-1 |
| | b) Derive the transient response of a series R-C circuit with ac input. Sketch the variation of current and voltages of it? | 5M | CO-1 | BL-1 |

UNIT-II

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|---|---|----|------|------|
| 3 | a) Define self inductance, mutual inductance & dot convention. | 5M | CO-2 | BL-2 |
| | b) Two coupled coils have inductances 6H and 12H with coefficient of coupling 0.8. Determine mutual inductance. | 5M | CO-2 | BL-2 |

OR

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|---|--|----|------|------|
| 4 | a) Three inductors of 4H, 6H and 10H are connected in series aiding. The mutual inductances are $M_{12} = 1H$, $M_{23} = 2H$ and $M_{13} = 1.5H$. Determine the total equivalent inductance. | 6M | CO-2 | BL-2 |
| | b) Discuss analogy between electric and magnetic circuit. | 4M | CO-2 | BL-2 |

UNIT-III

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|---|--|----|------|------|
| 5 | a) Draw the approximate equivalent circuit of a single-phase transformer referred to primary side and explain the significance of each parameter. | 6M | CO-3 | BL-3 |
| | b) A 5kVA transformer has primary voltage 1000V and secondary voltage 250V. Determine the primary and secondary currents at full load. Also calculate the turns ratio. | 4M | CO-3 | BL-2 |

OR

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|---|--|----|------|------|
| 6 | a) Derive the EMF equation of a single-phase transformer. | 4M | CO-3 | BL-2 |
| | b) Explain the operation of ideal single phase transformer at No load with Phasor diagram. | 6M | CO-3 | BL-3 |

UNIT-IV

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|---|--|----|------|------|
| 7 | a) Explain speed control methods of DC shunt motor with neat diagrams. | 5M | CO-4 | BL-2 |
| | b) Derive the EMF equation of a DC generator. | 5M | CO-4 | BL-2 |

OR

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|---|--|----|------|------|
| 8 | a) A 4-pole DC generator has wave winding with 600 conductors and flux per pole of 0.03Wb. If the generator rotates at 1000rpm, determine the generated EMF. | 5M | CO-4 | BL-2 |
| | b) Explain about the magnetization characteristics of DC shunt generator | 5M | CO-4 | BL-2 |

UNIT-V

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|---|---|----|------|------|
| 9 | a) Draw and explain torque-slip characteristics of induction motor. | 5M | CO-5 | BL-3 |
| | b) Explain the operation of BLDC motor with neat diagrams. | 5M | CO-5 | BL-3 |

OR

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|----|---|----|------|------|
| 10 | a) Discuss different types of synchronous machines. | 5M | CO-5 | BL-3 |
| | b) Explain the principle of operation of synchronous motor. | 5M | CO-5 | BL-2 |
