

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year I Semester Regular & Supplementary Examinations February-2024
ELECTRICAL MACHINES-III
(Electrical and Electronics Engineering)

Time: 3 Hours**Max. Marks: 60**

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

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|---|---|--|-----|----|----|
| 1 | a | Explain the principle of operation of a synchronous generator. | CO1 | L2 | 6M |
| | b | Compare the difference between salient pole and non-salient rotor. | CO1 | L2 | 6M |

OR

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|---|---|--|-----|----|----|
| 2 | a | Write short notes on
i) Pitch factor ii) Distribution factor with relevant derivations. | CO1 | L1 | 6M |
| | b | Compare between DC Generator and AC Generator. | CO1 | L2 | 6M |

UNIT-II

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|---|---|--|-----|----|----|
| 3 | a | State and explain the voltage equation of an alternator. | CO2 | L1 | 6M |
| | b | Define
i) Armature resistance ii) Leakage reactance iii) synchronous reactance
iv) Synchronous impedance | CO2 | L1 | 6M |

OR

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|---|---|--|-----|----|----|
| 4 | a | Define the voltage regulation of an alternator. Explain the various factors, which may affect the regulation of an alternator. | CO2 | L2 | 6M |
| | b | Describe the slip test method for the measurement of X_d and X_q of synchronous machine. | CO2 | L3 | 6M |

UNIT-III

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|---|---|--|-----|----|----|
| 5 | a | What is infinite bus bar? Explain synchronization of alternator with infinite bus bar. | CO3 | L2 | 6M |
| | b | Derive the expression for synchronizing current, synchronizing power and synchronizing torque. | CO3 | L3 | 6M |

OR

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|---|---|---|-----|----|----|
| 6 | a | Explain necessity of parallel operation of alternators. | CO3 | L2 | 4M |
| | b | A 5MVA, 10KV, 1500rpm, 50HZ alternator runs in parallel with other machines. Its reactance drop is 20%. Find a) No load b) Full load at 0.8PF lagging, the synchronizing power per unit mechanical angle of phase displacement and calculate the synchronizing if the mechanical displacement is 0.5. | CO3 | L3 | 8M |

UNIT-IV

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|---|---|--|-----|----|----|
| 7 | a | Explain the construction and working principle of a synchronous motor. | CO4 | L2 | 6M |
| | b | Explain the power flow equation of synchronous motor. | CO4 | L2 | 6M |

OR

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|---|--|---|-----|----|-----|
| 8 | | Derive the expression for induced or back EMF per phase at different power factors in the phasor diagram. | CO4 | L2 | 12M |
|---|--|---|-----|----|-----|

UNIT-V

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|---|---|--|-----|----|----|
| 9 | a | Define various torques associated with synchronous motors. | CO5 | L3 | 6M |
| | b | Explain the procedure for starting a synchronous motor. | CO5 | L2 | 6M |

OR

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|----|--|---|-----|----|-----|
| 10 | | Explain the operation of a synchronous motor at constant load variable excitation with a neat phasor diagram. | CO5 | L2 | 12M |
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