

Seat No.	
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S.E. (Mechanical) (Semester - III) Examination, April - 2018

ELECTRICAL TECHNOLOGY

Sub. Code : 63351

Day and Date : Wednesday, 25 - 4 - 2018

Total Marks : 100

Time : 2.30 p.m. to 5.30 p.m.

- Instructions :
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Draw neat figures wherever necessary.
 - 4) Assume suitable data, if missing. State it clearly.

Q1) a) Explain the function of [1×8]

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|------------------|------------------------------|
| i) Field winding | ii) Armature winding |
| iii) Commutator | iv) Interpoles in a dc motor |

OR

Differentiate between dc shunt motor and dc series motor about

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|-------------------------|----------------------------------|
| i) Field winding design | ii) Torque speed characteristics |
| iii) Starting torque | iv) Applications |

Answer any two of the following (b, c, d): [2×6]

- b) Explain the principle of reversing rotation of dc motor. Draw appropriate circuit diagrams.
- c) Explain the basic methods of speed control of dc series motor.
- d) A DC shunt motor runs at 1200 rpm driving a constant torque load by taking 10 A armature current from 200 V supply. Now 5 ohm resistance is series with the armature winding. Find the new armature current and new speed. The armature resistance is 0.6 ohm.

P.T.O.

Q2) Answer any TWO:

- a) Explain the working of 3 phase induction motor.
- b) Compare two types of 3 phase induction motor with different rotor constructions.
- c) Torque of 3 phase induction motor is given by $\frac{120sE_2^2R_2}{2\pi N_s(R_2^2 + s^2X_2^2)}$ where E_2 , R_2 , X_2 , s , N_s are rotor induced emf per phase at standstill, Rotor resistance per phase, Rotor reactance per phase at standstill, slip and synchronous speed respectively. Write the value of slip and expression for torque
 - i) At starting
 - ii) When the torque is maximum
 - iii) If rotor speed = Synchronous speed

Q3) Answer any TWO:

[2×8]

- a) Why does induction motor draw large current at large slip? Explain basic methods of reducing starting current of induction motor.
- b) Compare different methods of speed control of induction motor on the basis of
 - i) Effect on starting torque
 - ii) Suitability to different types of rotor
 - iii) Effect on current drawn while driving constant torque load
- c) Explain the principle of rotation reversal of 3 phase induction motor. Draw necessary circuit diagrams.

Q4) Answer any TWO:

[2×8]

- a) What is the difference between drive motor and servo motor? Describe methods of controlling dc servo motor.
- b) Describe the construction and working of any one type of stepper motor.
- c) Describe a linear induction motor. State its applications.

Q5) Answer any TWO:

- a) State starting and braking requirements of following load and state one suitable motor for each.
- | | |
|-------------------|----------------------|
| i) Paper mill | ii) Drilling machine |
| iii) Rolling mill | iv) Conveyor |
- b) Explain with examples the terms - active load, passive load, multimotor drive.
- c) Classify mechanical loads based on how the torque requirement changes with driving speed. Explain.

Q6) Answer any TWO:

[2×8]

- a) Compare core type induction furnace with coreless induction furnace.
- b) State basic principle of producing large heat for industrial use by using electric power. How is this principle adapted in resistance furnace, induction furnace, arc furnace.
- c) Find the input power to a furnace required to melt 500 kg metal scrap per hour. The scrap is preheated to 100 deg. C. Efficiency of furnace 60%, latent heat constant of metal 270 J/kg, specific heat constant of metal 450 J/kg, melting point = 1500 deg. C.

