

Total No. of Questions : 8]

SEAT No. :

P4831

[Total No. of Pages : 3

[5152]-547

**S.E. (Electrical Engineering)**  
**ELECTRICAL MACHINES - I**  
**(2015 Pattern) Theory**

*Time : 2 Hours]*

*[Maximum Marks : 50*

*Instructions to the candidates:*

- 1) *Answer Q.No. 1 or 2, Q.No.3 or 4, Q.No.5 or 6, Q.No.7 or 8.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1) a)** Develop equivalent circuit of single phase transformer referred to primary side. State clearly the assumptions made. [6]
- b) With suitable diagram explain construction and working of welding transformer. [6]

OR

- Q2) a)** With suitable circuit diagram and phasor diagram explain open delta or V-V connection of transformer. [6]
- b) Open circuit test conducted on single phase, 50 Hz, 200/400 volt transformer gave following test results. [6]
- voltage applied from LV side = 200 volt  
No load current drawn = 0.7 AMP  
watt meter reading on LV side = 70 watt.
- Determine the magnetising circuit constants from above data. also find copper loss at maximum efficiency condition.

- Q3) a)** Draw and explain following characteristics of DC series motor- [6]
- i) Torque-Armature current
  - ii) Speed Armature current

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- b) Derive emf equation of DC generator by usual notations. State clearly the meaning of each term used in the derivation. state the losses taking place in DC machine. [7]

OR

**Q4) a)** A DC shunt motor produces an output power of 7355 watt at a speed of 700 rpm. It is connected across 400 volt DC supply, the current drawn from supply is 23 AMP. The iron loss and mechanical friction, windage loss is 735.5 watt the shunt field resistance is 400 ohm. find armature resistance of the motor. [7]

- b) Compare armature voltage control method with field current control (flux control) method. (minimum six points of comparison expected) [6]

**Q5) a)** State the necessity of starter for 3 phase induction motor. with a suitable diagram explain rotor resistance starter used for 3 phase slipping induction motor. [6]

- b) The power input to the rotor of 440 volt, 50Hz, 3 phase, 6 pole induction motor in 60 Kw. it is found that the rotor emf makes 90 complete cycles per minute calculate-slip, rotor speed, rotor copper loss per phase, rotor resistance per phase if rotor current is 60 amp. [6]

OR

**Q6) a)** Explain the term-Induction motor is known as a generalised transformer

- b) Derive the expression for the following ratio

full load torque for 3 phase induction motor.

maximum torque

[6]

**Q7) a)** Draw torque-slip characteristics of 3 phase induction motor. explain it . clearly mark starting torque, maximum torque and the two regions of motor operation. [7]

- b) Draw equivalent circuit of 3 phase induction motor and explain each parameter in it. [6]

OR

- Q8)** a) A 3 phase induction motor has synchronous speed of 250 rpm and 4% slip on full load. the rotor has resistance of 0.02 ohm and stand still reactance 0.15 ohm per phase respectively. calculate- [7]
- i) The ratio of maximum torque to full load torque
  - ii) The speed at which the maximum torque is developed.
- b) Compare following starters used for 3 phase induction motor.  
stator resistance starter, star-delta starter [6]  
(minimum 3 points of comparison expected)