

22431

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3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.
 - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Attempt any FIVE of the following :

10

- (a) State any two applications of DC series motor.
- (b) Define synchronous speed and slip related to 3- ϕ IM.
- (c) List any two methods for speed control of 3- ϕ IM.
- (d) Give any four specifications of a 3- ϕ IM used in your laboratory.
- (e) Define Pitch Factor and Distribution Factor related to Alternator.
- (f) State the working principle of switched reluctance motor.
- (g) Define transformation ratio.

2. Attempt any THREE of the following :

12

- (a) Draw speed-torque characteristic for DC shunt motor. State any four observations from it.
- (b) A 3 ϕ , 16 pole, 50 Hz star connected alternator has 144 slots and 10 conductors / slot. The flux per pole is 30 mWb. Find phase and line EMF of alternator considering full pitched coil. ($K_d = 0.96$)



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- (c) For a BLDC motor, write – (i) major two components used (ii) two advantages (iii) two applications.
- (d) Draw an experimental set up to perform OC / SC test on a 1- ϕ transformer in your laboratory. State ratings of each meter.

3. Attempt any THREE of the following :

12

- (a) Draw a neat labelled sketch of star – delta starter used for a 3- ϕ IM.
- (b) A 3- ϕ , 10 kVA, 415 V, 50 Hz alternator supplies rated load at 0.8 pf lag. The effective armature resistance is 0.5 Ω / phase and synchronous reactance is 6 Ω / phase. Find the % voltage regulation at full load.
- (c) List any four applications of Permanent Magnet DC motor.
- (d) Give one application for each of the following transformers. – (i) isolation (ii) audio frequency (iii) radio frequency (iv) pulse

4. Attempt any THREE of the following :

12

- (a) A 4 pole, 50 Hz, 3- ϕ IM runs at 1440 rpm. Calculate slip.
- (b) Related to an Alternator, Give –
 - (i) one method of finding regulation
 - (ii) one type of rotor
 - (iii) meaning of synchronous reactance
 - (iv) one application
- (c) Write step by step procedure to draw a ‘V’ curve for a synchronous motor.
- (d) Draw a neat sketch of AC Servo motor. Write major points related to its construction.
- (e) State the maximum temperature range for the following insulation class.
 - (i) Y (ii) E (iii) A (iv) C

5. Attempt any TWO of the following : 12

- (a) Draw an experimental set up to perform speed control of DC shunt motor by flux control method. Draw and explain the output characteristic.
- (b) Compare squirrel cage IM with slip ring IM on following points. (i) construction (ii) starting torque (iii) efficiency (iv) applications (v) power factor (vi) speed control
- (c) Related to parallel operation of alternators write –
 - (i) necessity of it (ii) any two conditions required for it and (iii) any two advantages of it.

6. Attempt any TWO of the following : 12

- (a) Write the equation of Torque for a 3- ϕ IM. Derive condition for maximum torque. Also find maximum torque.
 - (b) For a synchronous motor, state –
 - (i) principle of working
 - (ii) two major parts
 - (iii) two methods of starting
 - (iv) use of damper winding
 - (v) two methods of braking
 - (vi) two applications
 - (c) Enlist different types of stepper motor and explain any one type with neat sketch.
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