

# 22418

**21222**

**3 Hours / 70 Marks**

Seat No. 

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15 minutes extra for each hour

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- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

- 1. Attempt any FIVE of the following: **10****
- a) Classify the different types of motors.
  - b) State the rule used for calculating direction of e.m.f. induced in armature winding of D.C Generator.
  - c) Define voltage transformation ratio of transformer.
  - d) Classify various losses of transformer.
  - e) State any two conditions of parallel operation of three phase transformer.
  - f) State the importance of “K” factor of transformer.
  - g) State any two application of pulse transformer.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Suggest the material for the following part of motor
    - i) Armature winding
    - ii) Commutator
    - iii) Brushes
    - iv) Frame
  - b) Explain the principle of working of an induction motor.
  - c) Explain construction and working of Brushless D.C motor.
  - d) Draw labelled diagram of three point starter.
- 3. Attempt any THREE of the following:** **12**
- a) Describe with sketches, speed control method used for getting speed below normal speed in case of D.C shunt motor.
  - b) Derive the EMF equation for the single phase transformer.
  - c) Draw the labelled phasor diagram of single phase transformer supplying load at lagging power factor.
  - d) Compare shell type and core type single phase transformer (any four points)
- 4. Attempt any THREE of the following:** **12**
- a) Compare the distribution and power transformer on any four points.
  - b) Explain the effects of harmonics on the operation of transformer.
  - c) Describe with neat relevant diagram, the test carried out on three phase transformer to identify the windings corresponding to same phase.
  - d) In a 25 KVA, 2000/200V single phase transformer, the iron and full load copper losses are 350 watt and 400 watt respectively. Calculate the efficiency at unity power factor on full load.
  - e) List any four features of isolation transformer with any four applications.

**5. Attempt any TWO of the following:****12**

- a) A dc series motor runs at 600rpm taking 100Amp from 230V supply. Armature and series field winding resistances  $0.12\Omega$  and  $0.03\Omega$  respectively. Calculate the speed when current has fallen to 50amp. Assume flux to be directly proportional to field current.
- b) Give the criteria for selection of distribution transformer and power transformer as per IS : 10028 (part - I)
- c) Two single phase transformer with equal turns have impedance of  $(0.5 + j3)\Omega$  and  $(0.6 + j10)\Omega$  respect with secondary. If they operate in parallel. Determine how they will share a load of total 100kW p.f. of 0.8 lagging?

**6. Attempt any TWO of the following:****12**

- a) A 10KVA, 1 phase, 50Hz 500/250V transformer have following result.  
OC test - (LV side) - 250V, 3A, 200W  
SC test - (HV side) - 15V, 30A, 300W.  
calculate efficiency and regulation at full load 0.8p.f. lagging.
- b) Explain with neat sketch the Scott connection scheme for conversion of three phase to two phase supply.
- c) A 50KVA, 4400/200V transformer has  $R_1 = 3.45\Omega$ ,  
 $R_2 = 0.009\Omega$ . The value of reactances are  $X_1 = 5.2\Omega$  and  
 $X_2 = 0.015\Omega$

Calculate for the transformer

- i) Equivalent resistance and reactance as referred to HV side.
  - ii) Equivalent resistance and reactance as referred to LV side.
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