

This question paper contains 5 printed pages.

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Your Roll No.

B.Tech. (M) / I **J**

Paper VI— ELECTRICAL TECHNOLOGY
(EME-106)

Time : 3 hours

Maximum Marks : 70

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Attempt any five questions. Symbols and
notations have their usual meaning.*

Assume suitable missing data, if any.

1. (a) Explain the following:

(i) Permeability

(ii) Hysteresis

(iii) Mutual Inductance.

2×3

(b) A 4-pole, long shunt, lap wound generator supplies 25 kW at a terminal voltage of 500 V. The armature resistance is 0.03Ω , series field resistance is 0.04Ω and shunt field resistance is 200Ω . The brush drop may be taken as 1 V. Determine the emf generated. 8

2. (a) Explain the following:

P. T. O.

- (i) Difference between moving coil and moving iron instruments.
- (ii) Methods for extending the range of voltmeter.
- (iii) Gravity control system is usually not used in electrical measuring instruments. $3 \times 3 = 9$
- (b) Obtain Thevenin's equivalent circuit at A and B, as shown in Fig.1. 5

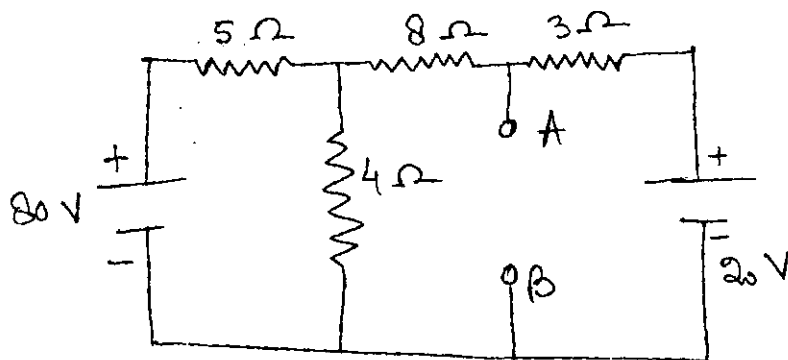


Fig.1

3. (a) Derive the emf equation of a dc generator. For designing high voltage dc generator which type of winding should be used and why? 7
- (b) A dc shunt machine connected to 230 V supply has a resistance of armature as 0.115Ω and of field winding as 115Ω . Find the ratio of the speed as a generator to the speed as a motor with the line current in each case being 100 A. 7

4. (a) Deduce the relationship between the phase and line quantities (voltages and currents) in three phase delta connected circuit.

Draw the phasor diagram to represent the above.

6

- (b) In the circuit of Fig. 2 determine:

- (i) The power supplied by the source
 (ii) The reactive power supplied by the source
 (iii) The reactive power of the capacitor
 (iv) The power factor of the circuit.

8

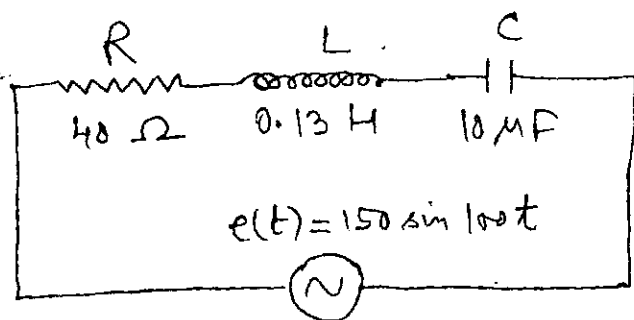


Fig. 2

5. (a) Develop the equivalent circuit of a single phase transformer. Mention the physical significance of all its parameters.

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- (b) A 5 kVA single phase, 230/400 V two winding transformer is connected as an autotransformer for 230/630V. Find:

P. T. O.

- (i) load current and current in each winding at the full permissible output
- (ii) efficiency at full load, if iron loss and full load copper loss are 30 W and 75 W respectively. 8
6. (a) Derive the expression for developed torque in a three phase induction motor and find the condition for maximum torque. 6
- (b) In a 6-pole, 3 phase, 50 Hz motor with star-connected rotor, the rotor resistance per phase is 0.3Ω , the leakage reactance at standstill is 1.5Ω per phase, and an emf between the slip-rings on open circuit is 175 V.
- Calculate:
- (i) Slip at a speed of 950 rpm
- (ii) Rotor emf per phase
- (iii) Rotor frequency at a speed of 950 rpm
- (iv) Rotor leakage reactance at a speed of 950 rpm. 8
7. (a) Derive emf equation of alternator and explain coil span factor and distribution factor. 7
- (b) Explain the principle of operation of a synchronous motor and V-curve. 7

8. Write short notes on any *two* of the following:

(a) Diversity Factor and Demand Factor

(b) Megger

(c) Tariffs

(d) Armature Reaction.

2×7