



Printed Pages : 7

TEE - 201

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2019

Roll No.

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**B. Tech.**

(SEM. II) EXAMINATION, 2007-08

**ELECTRICAL ENGG.**

Time : 3 Hours]

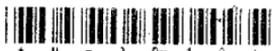
[Total Marks : 100

1 Attempt any **four** parts of the following: **4×5=20**(a) An alternating voltage is  $V=100 \sin 100 t$  ;  
*find*

- (i) Amplitude
- (ii) Time period and frequency
- (iii) Angular velocity
- (iv) Form factor
- (v) Crest factor.

(b) Determine the following in the circuit shown in  
**Fig 1b.**

- (i) The current phasors  $I$ ,  $I_1$  and  $I_2$ .
- (ii) Active Power dissipated in the three resistive branches.
- (iii) Power factor of the circuit.



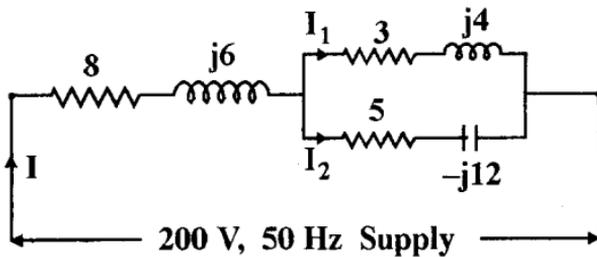


Fig. 1b

- (c) Explain the concept of bandwidth and quality factor for a series R-L-C circuit. Derive their expressions.
- (d) Establish the analogy between electric and magnetic circuits.
- (e) An effective voltage of 100 V is applied to the parallel combination of two impedances  
 $\bar{Z}_1 = R_1 + jX_1$  and  $\bar{Z}_2 = R_2 + jX_2$ . Assume that  
 $R_1 = 3 \Omega$  and  $R_2 = 4 \Omega$  and the magnitude of the two branch currents are same; determine the values of  $X_1$ ,  $X_2$  and the resultant source current.
- (f) A ring of ferromagnetic material has a rectangular cross section. The inner diameter is 7.4 in., the outer diameter is 9 in., and the thickness is 0.8 in. There is a coil of 600 turns wound on the ring. When the coil carries a current of 2.5A, the flux produced in the ring is  $1.2 \times 10^{-3} \text{ Wb}$ .



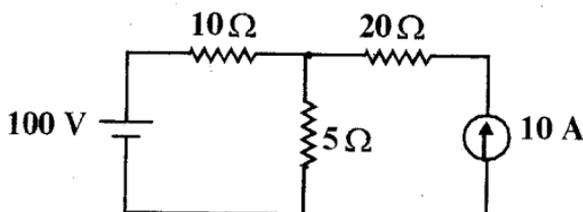
Find :

- (i) Magnetic field intensity
- (ii) Reluctance
- (iii) Permeability.

2 Attempt any **four** parts of the following : **4×5=20**

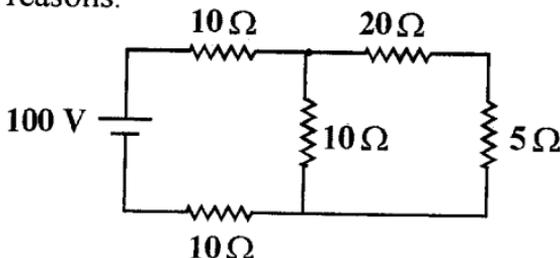
(a) Find the currents in all the resistive branches of the circuit shown in **Fig 2.a** by

- (i) KVL
- (ii) KCL



**Fig. 2.a**

(b) Determine the value of current through the  $5\ \Omega$  resistance using Norton's theorem in the circuit shown in **fig 2.b**. State whether superposition theorem can be applied for the circuit with reasons.



**Fig. 2.b**



- (c) In the network shown in Fig 2.c find
- The value of  $R_L$  for maximum power dissipation.
  - The value of the maximum power.

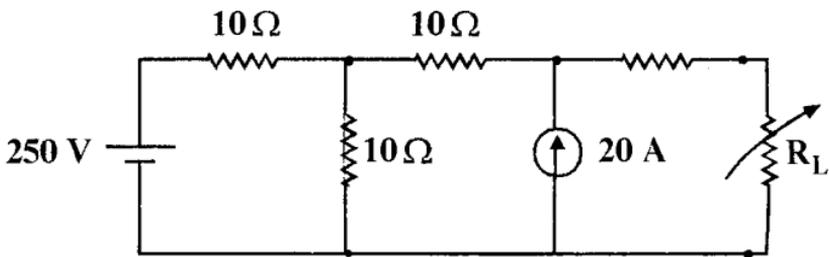


Fig. 2.c

- Explain the construction and working principle of a PMMC type instrument. What will it give as output if a half wave rectified ac having peak value of 100 is given as input ?
- Explain the construction and working principle of a Moving Iron attraction type instrument. Why is its scale non-uniform?
- In the circuit shown in fig 2.f, find the current through the  $6 \Omega$  register using superposition theorem.

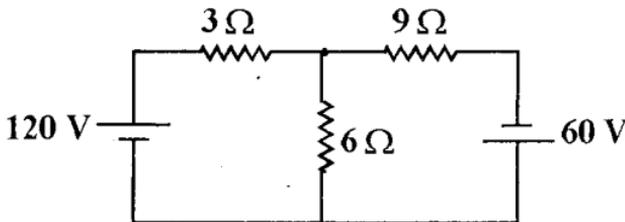


Fig. 2.f

3 Attempt any **two** parts of the following:  $2 \times 10 = 20$

- (a) Derive and explain the two Wattmeter method of measurement of three phase power for a balanced star connected load. How is the three phase power determined? Discuss the variations in readings for different power factors of loads from unity to zero.
- (b) A balanced 3-phase star-connected load of 180 kW taking a leading current of 60 amperes when connected across a 3-phase 440 V, 50 Hz supply. Find the values and nature of the load components and also power factor of the load.
- (c) Draw the phasor diagram of a single phase transformer for leading power factor load.

The efficiency of a 400 kVA, single phase transformer is 98.77% at full load 0.8 power factor and 99.13% at half full load unity power factor.

*Find :*

- (i) Iron losses at full and half full-loads
- (ii) Cu losses at full and half full loads.

4 Attempt any **four** parts of the following:  $4 \times 5 = 20$

- (a) Draw and explain the load characteristics of a DC generator. What is the reason for the difference in the load characteristics for a self and separately excited DC generator ?

- (b) Derive the EMF equation of a DC generator. What are Lap and Wave windings? Which among them is used for high current and which for high voltage DC generator?
- (c) A DC generator (self-excited) fails to build up. Discuss the reasons and remedies for the problem.
- (d) Briefly explain the various speed control methods of a DC motor. Which one of them is called constant torque method and why?
- (e) A DC shunt motor runs at 600 rpm taking 60 A from a 230 V supply. Armature resistance is 0.2 ohm and field resistance is 115 ohms. Find the speed when the current through the armature is *30A*.
- (f) Draw and explain the torque-speed, torque-current and speed current characteristics of a DC series motor. Give two applications of the DC motor.

5 Attempt any **two** parts of the following: **2×10=20**

- (a) Derive and draw the torque-slip characteristics of a 3-phase Induction motor. Show, the Breaking and Generating regions explaining the particular values of slips in these two regions.
- (b) Explain power flow in a 3-phase Induction Motor. Derive the relationship

$$P_g : P_{\text{mech}} : P_{\text{cu}} = 1 : (1-S) : S$$

Why is the core loss neglected in the rotor circuit of a 3-phase induction motor?



- (c) Write short notes on the following :
- (i) How the motors generally used in ceiling fans of daily use, are made self starting?
  - (ii) Rotating magnetic field in a 3-phase induction motor.
  - (iii) Induction motor as a transformer.
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