



C09-EE-303

3241

BOARD DIPLOMA EXAMINATION, (C-09)  
OCT/NOV—2017  
DEEE—THIRD SEMESTER EXAMINATION  
ELECTRICAL CIRCUITS

Time : 3 hours ]

[ Total Marks : 80

PART—A

3×10=30

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **three** marks.  
(3) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. State Thevenin's theorem. 3
2. Define the following terms : 1+1+1=3
  - (a) Lumped parameters
  - (b) Distributed parameters
  - (c) Mesh of an electric network
3. Derive the RMS value of a full wave rectified alternating quality. 3
4. Perform the following operations and express them in rectangular form : 3
  - (a)  $(A - B)$
  - (b)  $(A + B)$when  $A = (10 - j30)$ ,  $B = (5 + j60)$ .
5. Two currents are given by the expression  $i_1 = 15 \sin(314t - 60^\circ)$  amp,  $i_2 = 10 \sin(314t + 45^\circ)$  amp. Find  $i_1 + i_2$  and represent in the similar form. 3
6. Draw a vector diagram of an R-L-C series circuit if  $X_L > X_C$ . 3

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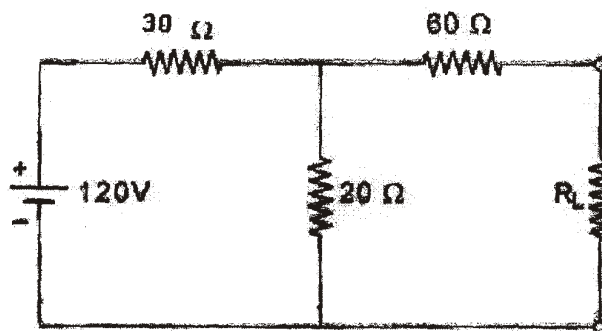
7. Define  $Q$ -factor for a parallel resonant circuit. 3
8. What are the different methods by which a parallel a.c. circuit can be solved? 3
9. A 3-phase, 415 V, 50 Hz supply is given to a balanced delta connected load. The current in each branch circuit is 30 A and phase angle is  $30^\circ$  lag, find—  
 (a) the line current;  
 (b) total power. 1+2
10. Compare between star- and delta-connection of 3- system. 3

**PART—B**

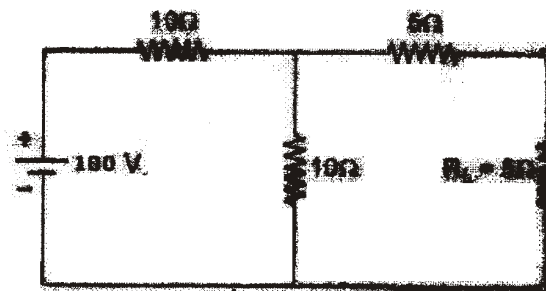
10×5=50

- Instructions :** (1) Answer *any five* questions.  
 (2) Each question carries **ten** marks.  
 (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. (a) Determine the value of  $R$  for maximum power in the resistance as shown in the figure and also calculate the power delivered under these conditions. 5

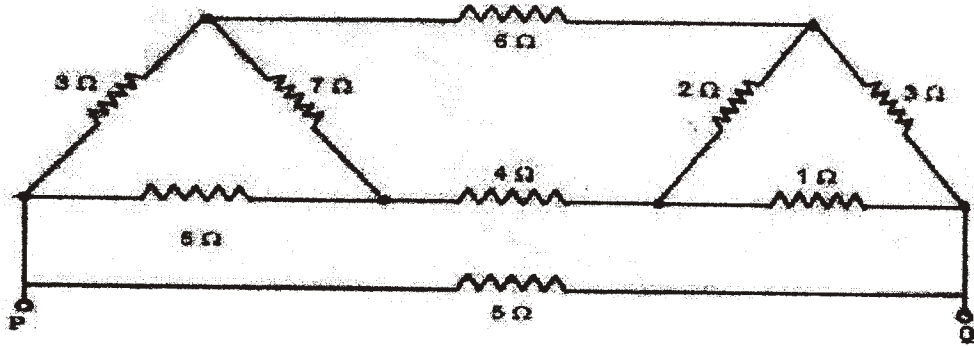


- (b) Using Norton's theorem, find the current in the load resistance  $R_L$  of the circuit shown below. 5



12. (a) Explain <sup>\*</sup>superposition theorem. 3  
 (b) Find the current in the 4 Ω resistor of branch AB of the network shown in the figure by using superposition theorem. 7
13. An alternating current of frequency 60 Hz has a maximum value of 120 A.  
 (a) Write the equation for instantaneous value.  
 (b) Reckoning time from the instant the current is zero and becoming positive, find the instantaneous value after 1/360 sec.  
 (c) Find the time taken to reach 96 A for the first time. 10
14. (a) The current flowing through a pure inductor is 20 A. Find the inductance and power consumption when the voltage applied the inductor is  $V = 200 \sin 314t$ . 5  
 (b) Show that the power consumed by a pure inductor is zero when AC supply is applied to it. 5
15. (a) Derive an expression for impedance of an AC circuit consisting of resistance and a pure capacitor in series. Draw also the vector diagram. 5  
 (b) A capacitor of 50 μF is connected in series with a resistor of 100 Ω. The combination is connected across a 230 V, 50 Hz AC supply. Calculate (i) impedance (ii) current (iii) power factor (iv) active power (v) reactive power. 1+1+1+1+1
16. A coil having a fixed resistance of 5 Ω and an inductive reactance of 20 Ω are connected in series. The whole circuit is connected across 230 V 50 Hz AC supply. Calculate (a) current drawn (b) power factor (c) active power (d) reactive power. 10
17. (a) Three similar coils, each having a resistance of 20 Ω and inductance of 0.05 H are connected in star to a 3-phase 50 Hz supply with 400 V between lines. Calculate the total power absorbed and the line current. 5  
 (b) A balanced 3-phase star-connected load of 100 kW takes a leading current of 80 A. When connected across 3-phase 1100 V, 50 Hz supply, find the circuit constants of the load per phase. 5

18. (a) Determine the resistance of the circuit between points P and Q as shown in figure. 7



- (b) How will the parameters resistance, inductive reactance, capacitive reactance vary with the frequency? 3

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