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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 then in rectangular form : 3
(a) (*A* *B*)
(b) (*A* *B*)
when *A* (10 30), *B* (5 60).

5. Two currents are given by the expression i_1 15 sin (314*t* 60) amp, i_2 10 sin (314*t* 45) 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

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° lag, find—

(a) the line current;

(b) total power. 1+2

10. Compare between star- and delta-connection of 3- system. 3

PART—B

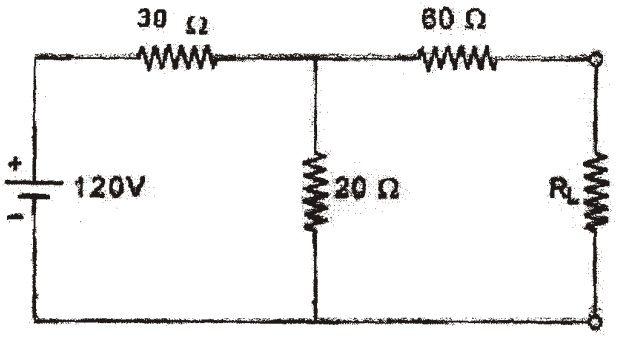
10×5=50

Instructions : (1) Answer *any* **five** questions.

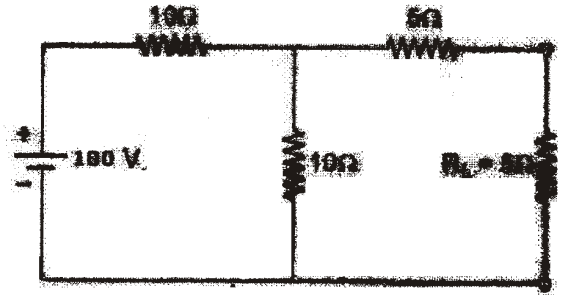
(2) Each question carries **ten** marks.

(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 superposition theorem. 3

(b) Find the current in the 4 resister 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

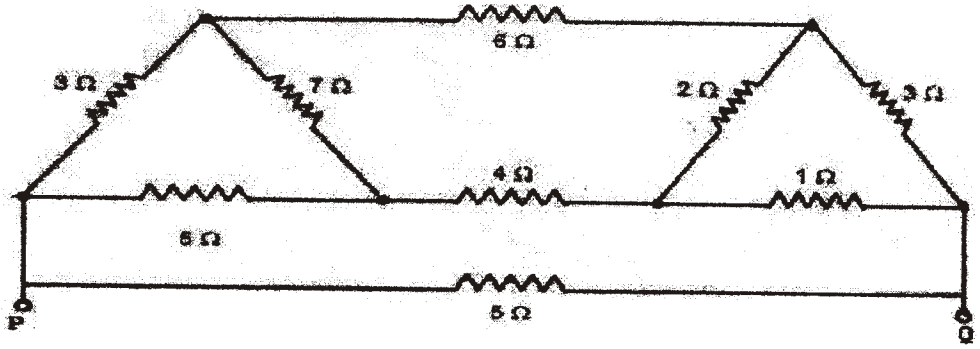
(b) A capacitor of 50 F is connected in series with a resistor of 100 . The combination is connected across a 230 V, 50 Hz AC supply. Calculate *(i)* impedance *(ii)* current *(iii)* power factor *(iv)* active power *(v)* reactive power. 1+1+1+1+1

16. A coil having a fixed resistance of 5 and an inductive reactance of 20 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 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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