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C09–EE–303

3241

BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2018

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) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Explain ideal voltage source and ideal current source.

2. Three resistors, having resistance of 20 , 30 and 50 , are connected in delta as branches of *AB*, *BC* and *CA* respectively. Calculate the resistances of equivalent star values.

3. Perform the following operations :

(i) *A* *B*

(ii) *A* / *B* if *A* 3 *j*4, *B* 10 60

4. Define the terms *(a)* form factor and *(b)* peak factor.

5. Two currents are given by the expression

i_1 10 sin (314t 45) amp; i_2 8 sin (314t 60) amp

Find i_1 i_2 and represent in the similar form.

6. Define Q-factor of series resonant circuit.

7. Derive the formulae for impedance for the R-C series circuit when it is connected to AC supply.

8. Draw a vector diagram of an R-L-C series circuit if X_L X_C.

9. State the advantages of 3-phase system over single-phase system.

10. Write the relation between line and phase values of current and voltage in 3-phase star and delta circuit.

PART—B

10×5=50

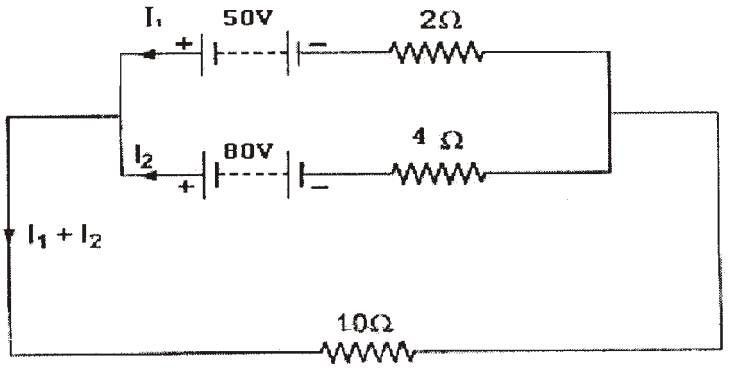
Instructions : (1) Answer *any* **five** questions.

(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.

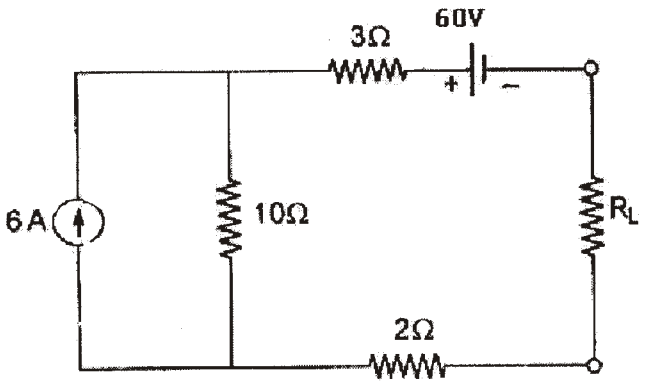
11. *(a)* State and explain Kirchhoff's laws. 5

(b) In the network shown below, find the current and its nature through batteries A and B. Also determine the PD across the external resistance. 5



12. *(a)* State Norton's theorem. 4

(b) Find the value of R_L in the figure given below for the maximum power consumed by R_L and find the maximum power : 6



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.

Time taken to reach 96 A for the first time.

14. *(a)* The current flowing through a pure inductor is 20 A. Find the inductance and power consumption, when the voltage applied across the inductor is $V \quad 200 \sin 314t$. 5

(b) Show that the power consumed by a pure inductor is zero, when AC supply is applied to it. 5

15. A coil of resistance 10 , inductance 0·2 H is connected across a capacitor. The combination is connected to 230 V, variable frequency supply. The resonance frequency is 150 Hz. Find *(a)* X_L, *(b)* Z_L, *(c)* capacitance, *(d)* Q-factor of the coil and *(e)* current through the coil.

16. An *R-L* circuit takes a current of 3 A at a p.f. of 0·6 lag when connected to a 115 V, 50 Hz supply. Another *R-C* circuit takes a current of 5 A at a p.f. 0·8 lead when connected to the same supply. If the two circuits are connected in series across a 230 V, 50 Hz supply, calculate—

(a) the resistance and inductance of *R-L* circuits;

(b) the resistance and capacitance of *R-L* circuits;

(c) the current, power consumed and p.f. of the combined circuit.

17. A three-phase delta-connected RYB system with an effective voltage of 400 V, has a balanced load with impedances (6 *j*8) . Calculate the—

(a) phase currents;

(b) line currents;

(c) power in each phase.

18. *(a)* State and explain Thevenin's theorem.

(b) A resistance of 10 and an inductance of 0·1 H are connected in series across a supply of 220 V and 50 Hz. Determine the—

(i) impedance;

(ii) current;

(iii) power factor;

(iv) power.

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