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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. Define the following terms : 1+1+1=3

(a) Lumped parameters

(b) Distributed parameters

(c) Mesh of an electric network

2. How do you convert the given ideal current source into ideal voltage source?

3. Derive an expression for average value of a sinusoidally varying quantity.

4. Perform the following operations :

(a) $(A \quad B) / C$

(b) $(A * C) / B$

when $A \quad 10 \quad j20$, $B \quad 20 \quad 45$ and $C \quad 5 \quad 30$

5. Two currents are given by the expression $i_1 \quad 20\sin(314t \quad 60)$ amp, $i_2 \quad 15\sin(314t \quad 45)$ amp. Find $i_1 \quad i_2$ and represent in the similar form.

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

7. The voltage across a 0·1 f capacitor is given by *V* 150 sin 400*t*. What is the sinusoidal expression for the current? Draw the waveform for *V* and *i*. 2+1=3

8. Define *Q*-factor for a parallel resonant circuit.

9. A balanced 3- delta connected load has per phase impedance of (25 *j*40) . If 415 V and 3-phase supply is connected to this load, find—

(a) the phase current;

(b) the power supplied to the load. 1+2=3

10. A 3- delta-connected AC motor when connected to a 440 V 50 Hz AC supply develops 25 kW at efficiency 90% and the power factor is 0·8. Calculate the line current and phase current.

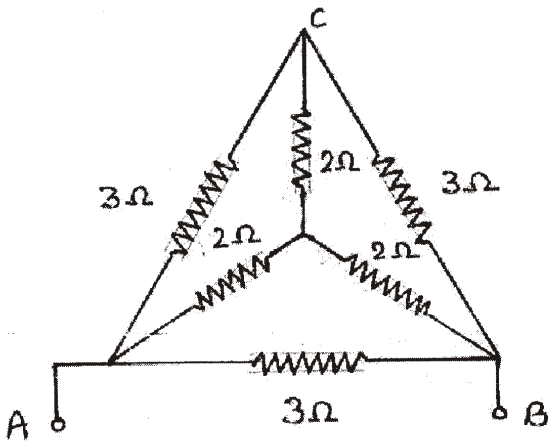
PART—B 10×5=50

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

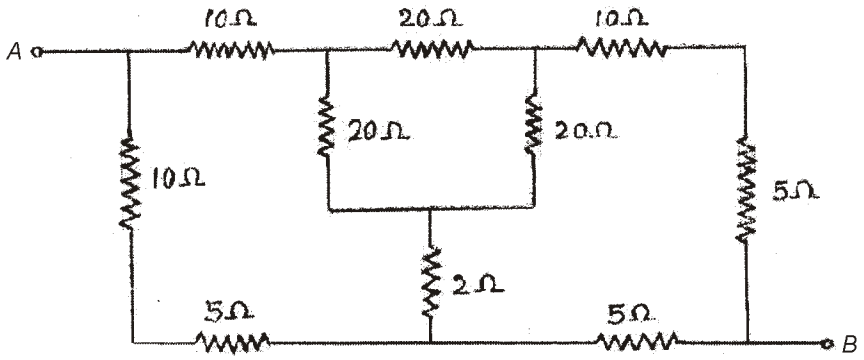
(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

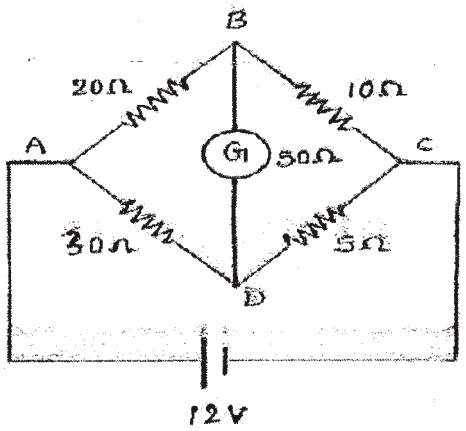
11. *(a)* Determine the resistance of the network between points *A* and *B* shown in the figure below : 5



(b) Determine the resistance between the terminals *A* and *B* for the circuit shown in the figure below : 5



12. Find the current through galvanometer as shown in the figure below using Thevenin's theorem :



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 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.

14. A 20 resistor is connected in series with an inductive coil and a capacitor of 0·2 H and 150 F across 200 V variable frequency supply. Find the *(a)* resonant frequency, *(b)* current drawn at resonant frequency, *(c)* voltage across inductance and *(d)* voltage across capacitance.

15. 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 the *(a)* current drawn, *(b)* power factor, *(c)* active power and *(d)* reactive power.

16. A series *R-L-C* circuit consists of resistor of 100 inductor of 0·318 H and a capacitor of unknown value. This is energized by 230 0 50 Hz sinusoidal supply. The current was found to be 1·15 60 amp. Find the—

(a) value of capacitor;

(b) voltage across the inductor;

(c) total power consumed.

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 the lines. Calculate the total power absorbed and the line current in each case. 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)* State and explain maximum power transfer theorem. 5

(b) Two circuits, having impedances Z_1 (10 j15) , Z_2 (6 j8) , are connected in parallel. If the total current supplied is 20 A, what is the power taken by each branch? 5

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