* 3 2 4 1 *

C09–EE–303

3241

BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—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. Define active circuit and passive circuit.

2. State Thevenin's theorem.

3. Define average value, form factor and peak factor.

4. Derive the RMS value of a full-wave rectified sine waveform.

5. Perform and represent in polar form *(a) A B* and *(b) A / B*, where *A* 5 *j*6 and *B* 6 *j*8.

6. Derive an expression for current in pure capacitive circuit, when an alternating voltage $v \quad V_m \sin \quad t$ is applied.

7. State the formula for power factor in *R-L-C* series circuit.

8. Compare series with parallel resonant circuits.

9. Give the advantage of polyphase system.

10. List the relation between line values and phase values in star and delta connected systems.

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 Kirchhoff's laws. 4

(b) Determine the equivalent resistance across *AB* of the circuit shown in Fig. 1 : 6

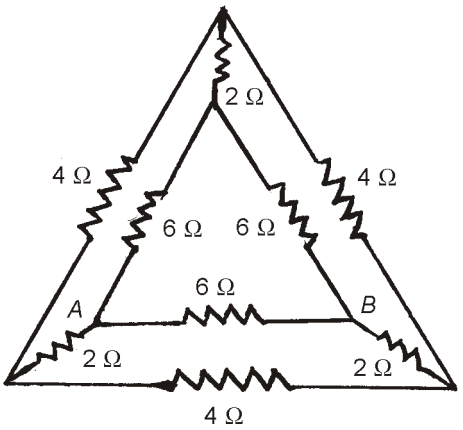

Fig. 1

12. Find the current through 20 resistance of the network (Fig. 2) by using superposition theorem : 10

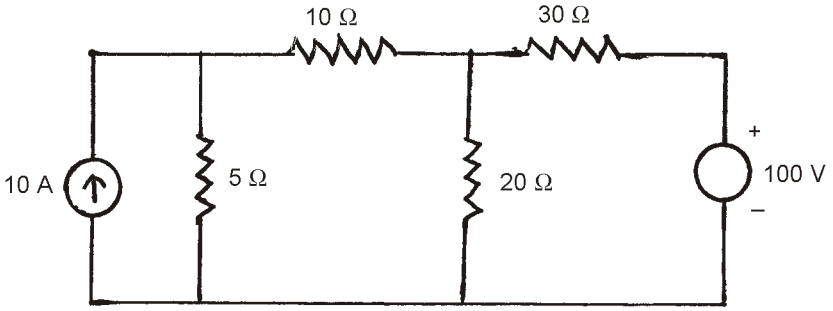

Fig. 2

13. *(a)* State and explain the maximum power transfer theorem. 7

(b) The equation of an alternating current is i 100 sin 628t. Determine—

(i) RMS value;

(ii) average value;

(iii) time period. 3

14. *(a)* Convert the following rectangular to polar or polar to rectangular : 4

(i) 4 $j6$

(ii) 20 30

(b) Show the average power consumed in an inductor and a capacitor is zero. 6

15. A resistance of 10 and inductance of 0·1 H are connected in series across a supply of 220 V and 50 Hz. Determine *(i)* the impedance, *(ii)* current flowing, *(iii)* power factor, *(iv)* the phase angle between V and I and *(v)* total power consumed. 10

16. Two impedances Z_1 10 $j15$ and Z_2 6 $j8$ are connected in parallel. If the total current supplied is 15 A, find the voltage applied, current and the power taken by each branch. 10

17. A series RLC circuit consists of 1000 , L = 100 mH and C = 10 pF. If the applied voltage across the circuit is 100 V, find *(a)* resonant frequency, *(b)* current at resonance and *(c)* Q-factor of the circuit. 10

18. A balance 3- star connected load of 150 kW takes a leading current of 100 A with a line voltage of 1100 V at 50 Hz. Find the power factor and circuit constants and draw its vector diagram. 10

★ ★ ★