



C14-EE-303

4245

BOARD DIPLOMA EXAMINATION, (C-14)
MARCH/APRIL—2016
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 the terms branch, loop and junction of an electrical network. 1+1+1
2. Define unilateral circuit and bilateral circuit with an example of each. 1½+1½
3. Define the following terms : 1+1+1
 - (a) Instantaneous value
 - (b) Form factor
 - (c) Peak factor of an alternating quantity
4. Derive average value of a half-wave rectified sine wave. 3
5. A sinusoidal voltage has a maximum value of 100 V with 50 Hz frequency. Find (a) instantaneous value after 0.002 sec and (b) the time taken to reach 45 V for the first time. 1½+1½
6. Draw the graphical representation of series resonance by showing (a) resonant frequency, (b) impedance and (c) current. 1+1+1

7. Derive an expression for the impedance of $R-L-C$ series circuit. 3
8. Why is a parallel resonant circuit called as rejector circuit? 3
9. Compare between star and delta connection of 3-phase system. 3
10. Three similar coils connected in star take a total power of 1.5 kW at a power factor of 0.2 lag from a 3-ph 400 V, 50 Hz supply. Calculate the resistance and inductance of each coil. 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) State Kirchhoff's laws. 3
- (b) Find the current through 5 resistor for the network shown in Fig. 1 by using Kirchhoff's laws. 7

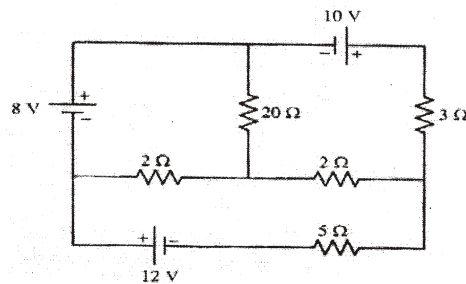


Fig. 1

12. (a) Find the equivalent resistance between X and Y for the circuit shown in Fig. 2. 5

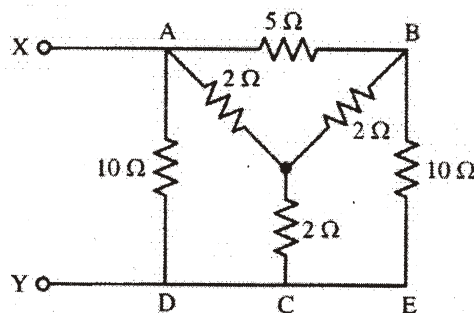


Fig. 2

- (b) Find the current supplied by the battery using star/delta transformation for the circuit shown in Fig. 3. 5

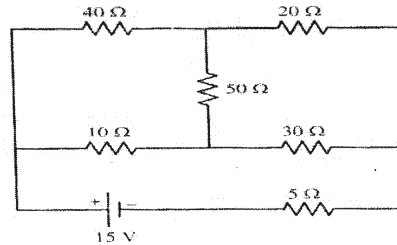


Fig. 3

13. (a) Determine the current through 10 ohm resistor of the network shown in Fig. 4 by using Norton's theorem. 6

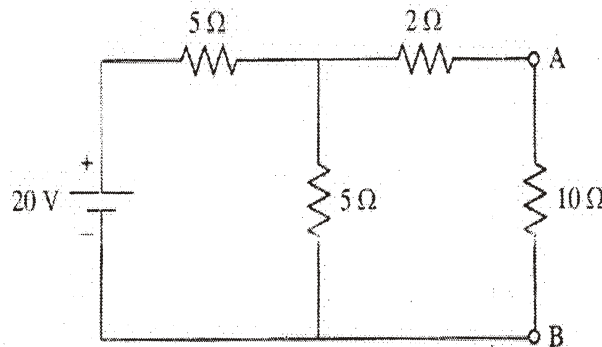


Fig. 4

- (b) Find the value of R_1 of the network shown in Fig. 5 for which the power absorbed will be maximum. Also, find the value of maximum power. 4

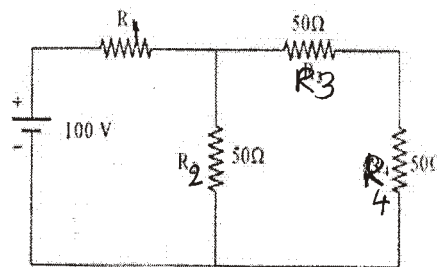


Fig. 5

14. (a) Derive the relationship between poles, speed and frequency. 5
 (b) Define RMS value of an alternating current and derive its formula by using analytical method. 5

15. (a) Draw the impedance triangle of R - L and R - C series circuits. 2
- (b) A coil A takes a current of 20 A at a power factor of 0.8 lag with an applied voltage of 100 V. Another coil B takes a current of 20 A at a power factor of 0.7 lag with an applied voltage of 50 V. What voltage will be required to produce a total current of 20 A with the two coils A and B in series. 8
16. A series R - L - C circuit with a resistance of 50 ohms, a capacitance of 25 μ F and an inductance of 0.15 H is connected across a 230 V, 50 Hz supply. Determine the impedance, current, power factor and power consumption of the circuit. Also draw the relevant phasor diagram. 10
17. Three impedances Z_1 (19 + j12 Ω), Z_2 (0 + j62 Ω) and Z_3 (12 - j15 Ω) are connected in parallel across a 100 V, 50 Hz a.c. supply. Find the current in each branch and total current. 10
18. (a) What are the effects of load power factor on wattmeter readings of a 3-ph a.c. circuit? 4
- (b) Three identical coils connected in delta to a 415 V, 50 Hz, 3-ph a.c. supply takes a line current of 5A at a power factor of 0.8 lag. If these coils are connected in star to the same supply calculate the line current and total power. 6

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