7249

BOARD DIPLOMA EXAMINATION, (C-20)

MAY—2023

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 terms *(a)* branch, *(b)* loop and *(c)* junction.

2. Differentiate between active and passive circuits in any five aspects.

3. State superposition theorem.

4. Define the terms *(a)* amplitude, *(b)* cycle and *(c)* frequency of an alternating quantity.

5. Define *(a)* form factor and *(b)* peak factor of an AC quantity.

6. Convert the following polar to rectangular or rectangular to polar :

(a) $200 \angle 30°$

(b) $16 + j12$

7. A pure capacitor takes a current of 30 A from 230 V, 50 Hz supply. Find the capacitance of a capacitor.

8. Define resonance and write a formula for resonant frequency of a RLC series circuit.

9. List the methods for solving two branch parallel AC circuits.

10. State the relation between line and phase values (voltage and current) of delta connected network.

PART—B

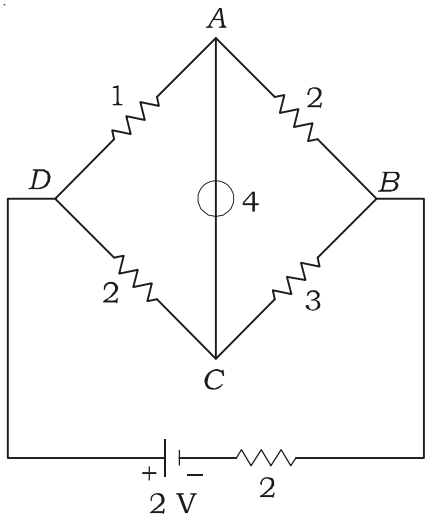
8×5=40

Instructions : (1) Answer **all** questions.

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

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

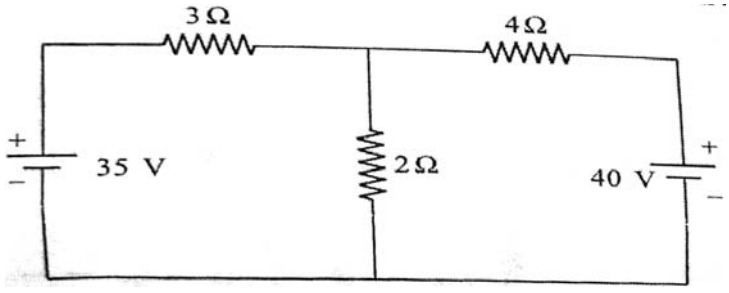
11. *(a)* Determine the currents in the unbalanced bridge circuit of Fig. using Kirchhoff's laws.



(OR)

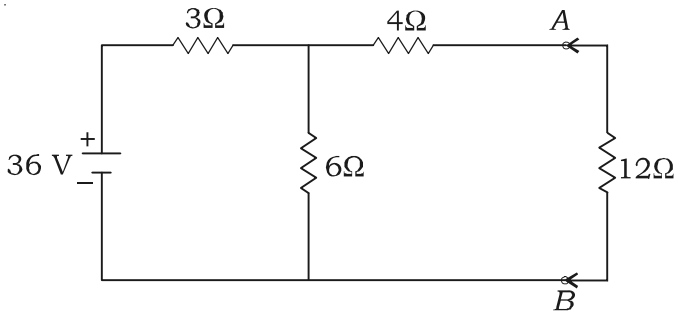
(b) Develop transformation formulae for star-delta transformation.

12. *(a)* Find the current in 2Ω resistance by superposition theorem in the network shown in fig.



(OR)

(b) Apply Thevenin's theorem to find current flowing through the 12 Ω resistor in the circuit shown in Fig.



13. *(a)* A circuit of 20 μF is connected in series with a resistor of 120 Ω across a 200 V, 50 Hz supply. Calculate *(i)* impedance, *(ii)* current, *(iii)* voltage across resistor and capacitor *(iv)* power factor and phase angle and *(v)* power absorbed in the circuit.

(OR)

(b) Derive the relation between voltage and current in a pure inductive circuit.

14. *(a)* A series *R-L-C* circuit with a resistance of 50 ohms, a capacitance of 25 mF 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.

(OR)

(b) A current of 5 A flows through a non-inductive resistance in series with a coil when supplied at 250 V, 50 Hz. If the voltage across the resistance is 125 V and across the coil is 200 V, calculate *(i)* impedance of the coil (Z), *(ii)* reactance, *(iii)* resistance of coil (R) coil, *(iv)* p.f. of the coil and *(v)* total power consumed in the circuit.

15. *(a)* Three coils each having a resistance of 20Ω and inductive reactance of 15Ω are connected in star to a 3-ϕ 400 V, 50 Hz supply. Calculate *(i)* line current, *(ii)* power factor and *(iii)* power consumed.

(OR)

(b) Derive the formula for measurement of 3-phase power by using two-wattmeter method.

PART—C

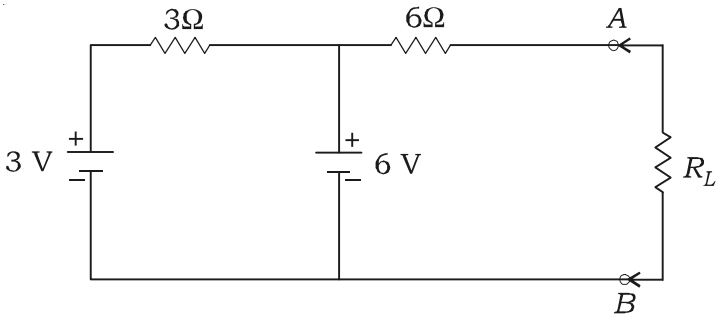
10×1=10

Instructions : (1) Answer the following question.

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

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

16. Calculate the value of *R-L* which will draw maximum power from the circuit of fig. given below. Also, find the value of this maximum power.



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