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C20-EE–305

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BOARD DIPLOMA EXAMINATION, (C-20)

JUNE/JULY—2022

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. State Kirchhoff's Laws.

2. Three resistances of 2Ω, 4Ω and 6Ω are connected in Star. Find the equivalent delta connected resistances.

3. State Thevenin's theorem.

4. Define *(i)* instantaneous value, *(ii)* time period and *(iii)* frequency of an alternating quantity.

5. Explain the terms phase and phase difference.

6. Derive an expression for RMS value of square wave.

7. Prove that the average power consumed in a pure Inductor is zero.

8. A pure capacitor takes a current of 25 A from 200 V, 50 Hz supply. Find the capacitance of a capacitor.

9. State the relation between line and phase values of delta connected system.

10. Derive the relation for line voltage and phase voltage in case of star connected system.

PART—B

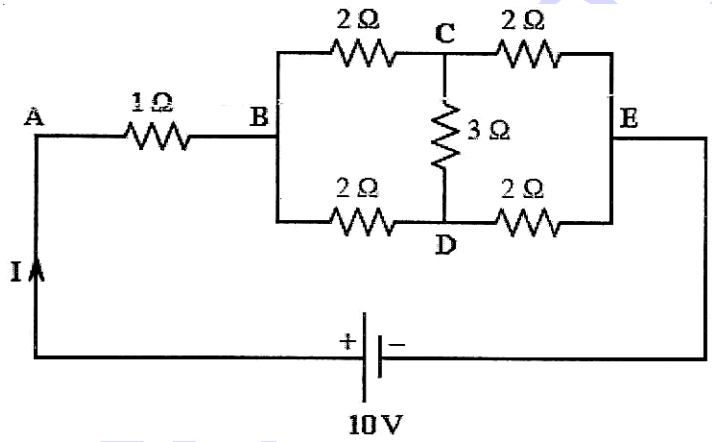
8×5=40

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.

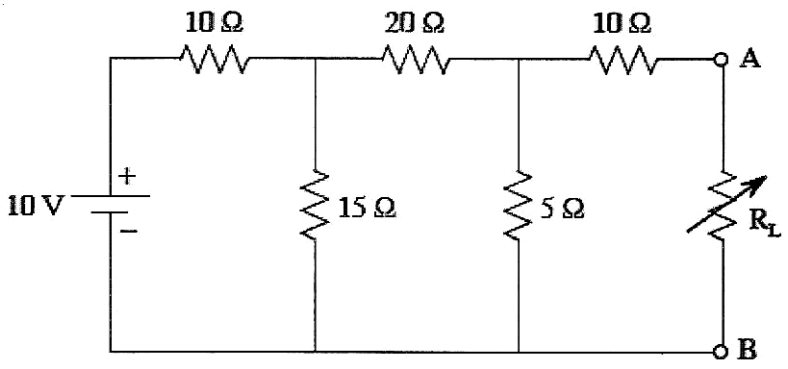
11. *(a)* Find the power loss in 1Ω resistor in the circuit shown in figure below by using Star-Delta transformation.



(OR)

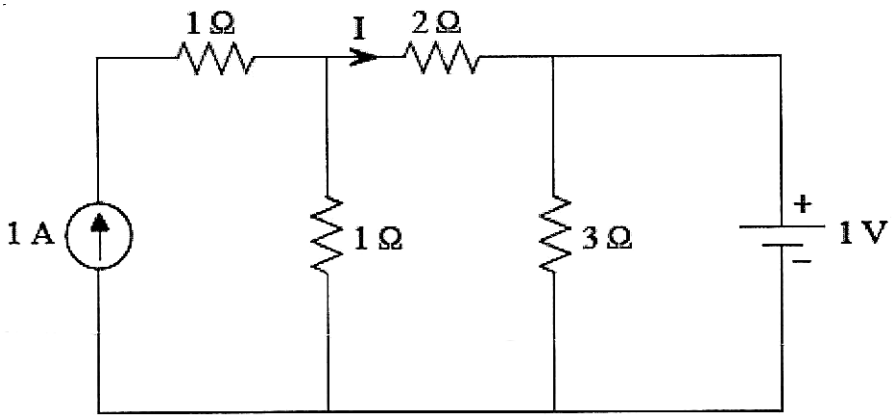
(b) Explain the Kirchhoff's Voltage law with a suitable example.

12. *(a)* Determine the value of R_L and maximum power in the circuit shown in figure below for maximum power transfer.



(OR)

(b) Find the voltage across 2Ω resistor in the circuit shown in figure below by using superposition theorem.



13. *(a)* A coil of resistance 6Ω and an inductance of 0·03 H is connected across of 50 V, 60 Hz supply. Find the *(i)* current, *(ii)* phase angle, *(iii)* power factor and *(iv)* power.

(OR)

(b) Two impedances (10 + *j*15)Ω and (6 – *j*8)Ω are connected in parallel across 230 V, 50 Hz supply. Calculate the total current and phase angle.

14. *(a)* A series *R-L-C* circuit, has a resistance of 5Ω, an inductance of 0·5 H and capacitance of 10 μF is connected across a 200 V, 50 Hz supply. Find the input current and voltage across each element.

(OR)

(b) A *R-L-C* series circuit consists of R = 10Ω, L = 25 mH and C = 100 μF connected across 200 V supply. Calculate *(i)* Resonant frequency, *(ii)* impedance at resonance, *(iii)* current at resonance and *(iv)* Q-factor.

15. *(a)* Three coils having a resistance of 20Ω and an inductance of 0·05H are connected in star across 3-phase 400V supply. Determine the line current and total power.

(OR)

(b) A star connected alternator supplied a delta connected load. The load impedance of each branch $(6 + j8)\Omega$. The line voltage is 225 V. Determine *(i)* current in each phase of the load, *(ii)* current in each phase of the alternator, *(iii)* power drawn by the load and *(iv)* load power factor.

PART—C

10×1=10

Instructions : (1) Answer the following question.

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

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

16. The power in 3-phase circuit can be measured with two watt meters only. Justify.

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