22212

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3 Hours / 70 Marks Seat No. | | | | | | | | |

15 minutes extra for each hour

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define the term resistance and state its unit.

(b) State Ohm's law applied to an electrical circuit and express it in the form of equation.

(c) Define dielectric strength and breakdown voltage.

(d) State the values of permeability of free space and permeability of air.

(e) Define the following terms :

(i) MMF

(ii) Reluctance

(f) List two types of induced emf.

(g) State Faraday's law of Electromagnetic induction.

2. Attempt any THREE of the following : **12**

(a) List any four types of resistors. Give one application of each.

(b) Find the equivalent resistance between terminals A and B shown in Figure No. 1 given below :

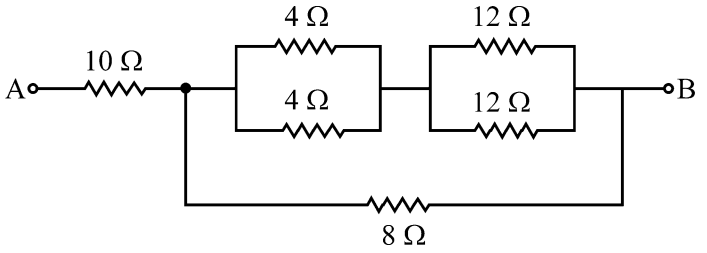

Figure No. 1

(c) (i) State the equation for energy stored in capacitor.

(ii) If 200 V source is applied to parallel combination of 3 capacitors of 4 μf, 8 μf and 12 μf. Calculate energy stored in each capacitor.

(d) Compare statically induced emf with dynamically induced emf on following four points :

(i) Movement of coil or magnet

(ii) Current

(iii) Expression of induced emf

(iv) Application

3. Attempt any THREE of the following : **12**

(a) State and explain Kirchhoff's voltage law.

(b) A furnace takes a current of 10 ampere from 200V DC supply for 8 hours. Calculate energy consumed in kWh.

(c) Find the current flowing through 8Ω resistor using KVL. Refer Figure No. 2.

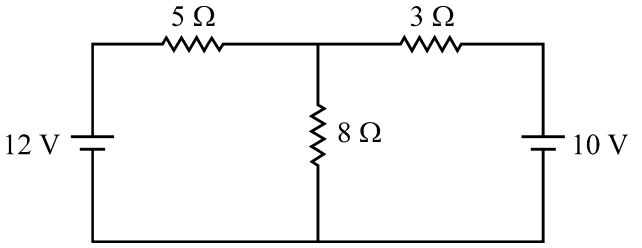

Figure No. 2

(d) List four factors affecting capacitance of capacitor.

4. Attempt any THREE of the following : **12**

(a) Define electrical work & electrical energy. Give SI units of each.

(b) Calculate resistance between terminals A and B, using star-delta conversion. Refer Figure No. 3.

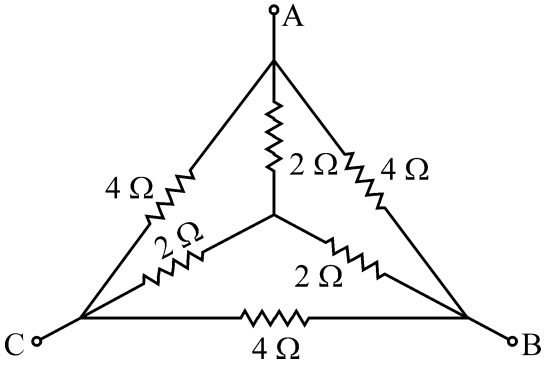

Figure No. 3

(c) The resistance of copper coil increases from 70 Ω at 12 ºC to 95.5 Ω at 60 ºC. Find temperature coefficient of material at 0 ºC.

(d) Three capacitors have capacitances 2 μf, 3 μf, 5 μf. What is the effective capacitance when connected in :

(i) Series

(ii) Parallel

(e) Derive an expression for capacitance of the parallel plate capacitor with medium partly air.

5. Attempt any TWO of the following : **12**

(a) Compare magnetic circuit and electric circuit stating three similarities & three dissimilarities.

(b) An iron ring of 20 cm diameter and 5 cm^2 cross-section area is wound with 300 turns. Flux density of iron is 1 Wb/m^2 and permeability of 500. Find :

(i) Reluctance

(ii) Flux

(iii) MMF

(iv) Current

(c) Calculate the inductance and energy stored in magnetic field of air cored coil of 300 cm long, 60 cm diameter and wound with 5000 turns and carrying 8 A current.

6. Attempt any TWO of the following : **12**

(a) Draw hysteresis loop for hard steel, cast steel, sheet steel and non-magnetic material. Also write application of each material.

(b) Two coils, A of 1500 turns and B of 1200 turns are such that 70% of flux produced by coil A links with coil B. A current of 5 Ampere in coil A produces flux of 0.04 Wb in coil A and 0.085 Wb in coil B. Find :

(i) L_1

(ii) L_2

(iii) M

(iv) K

(c) Related to electromagnetic induction :

(i) Define Self-inductance & Mutual inductance.

(ii) Write one equation of each of the above.

(iii) State the Values of Coupling Factor for tight coupling and loose coupling.

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