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V—99—2017

FACULTY OF SCIENCE

B.Sc. (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2017

(CBCS Pattern)

PHYSICS

Paper IV

(Electricity and Magnetism)

(Friday, 17-11-2017)

Time : 10.00 a.m. to 12.00 noon

Time—Two Hours

Maximum Marks—40

N.B. :— (i) All questions are compulsory.

(ii) Non-programmable calculator and log-table allowed.

(iii) Symbols have their usual meaning.

MCQ

1. Choose the *correct* alternative :

(i) Relation between turns ratio and current of a transformer is

(a) $\frac{N_1}{N_2} = \frac{I_2}{I_1}$

(b) $\frac{N_1}{N_2} = \frac{I_1}{I_2}$

(c) $\frac{N_1}{N_2} > \frac{I_1}{I_2}$

(d) None of these

(ii) The choke coil is used to reduce in a circuit.

(a) Resistance

(b) Frequency

(c) Current

(d) None of these

(iii) Henry is the SI unit of

(a) Mutual inductance

(b) Self inductance

(c) both (a) and (b)

(d) None of these

P.T.O.

- (iv) If I be the current passing through a solenoid having N no. of turns then magnetic Induction is :

(a) $B = \frac{\mu N}{l} I$

(b) $B = \frac{\mu I}{N}$

(c) $B = \mu NI$

(d) $B = \mu I$

- (v) The relation between susceptibility and permeability is

(a) $x = \mu$

(b) $x = \mu_0 \mu_r$

(c) $x = \mu_0(\mu_r - 1)$

(d) None of these

- (vi) If the first and eleventh throws of a B.G. are 20 cm and 10 cm respectively, then the logarithmic decrement is

(a) 0.793

(b) 0.693

(c) 0.963

(d) 0.369

- (vii) Total force on a current carrying conductor in a uniform magnetic field is $F = \dots\dots\dots$

(a) $\vec{B} \times l$

(b) $I l$

(c) $B^2 \times l$

(d) $I l \times \vec{B}$

- (viii) The Lorentz force law is

(a) $\vec{F} = \vec{E} + \vec{B}$

(b) $\vec{F} = \vec{E} \times \vec{B}$

(c) $\vec{F} = q_0 \left(\vec{E} + \vec{V} \times \vec{B} \right)$

(d) None of these

- (ix) Work done in establishing current in an inductance is

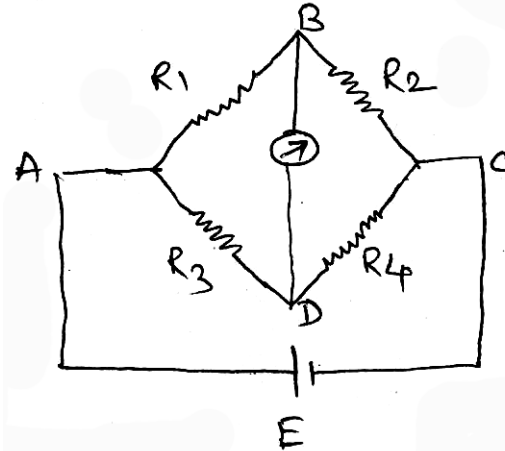
(a) $W = \frac{1}{2}LI^2$

(b) $W = 2LI^2$

(c) $W = LI^2$

(d) $W = \frac{1}{2}L^2I$

- (x) The balance condition for A.C. bridge given below is



- (a) $\frac{R_2}{R_1} = \frac{R_4}{R_3}$ (b) $\frac{R_1}{R_2} = \frac{R_3}{R_4}$
 (c) $\frac{R_1}{R_3} = \frac{R_2}{R_4}$ (d) $\frac{R_2}{R_1} = \frac{1}{R_3 R_4}$

Theory

2. Attempt any *five* of the following : 10

- (a) For a transformer if,
 $N_1 = 200$ turns, $N_2 = 50$ turns, $E_1 = 120$ volts,
 then find E_2 .
- (b) Draw circuit diagram of Owen's bridge and state its balance condition.
- (c) Define self inductance and mutual inductance.
- (d) What do you mean by damping correction ?
- (e) State Ampere's circuital law.
- (f) Define magnetic induction.
- (g) State Faraday's laws of electro-magnetic induction.

P.T.O.

3. Attempt any *two* of the following : 10
- (a) State and explain Biot-Savart's law.
 - (b) Derive an equation for logarithmic decrement of a B.G.
 - (c) Derive an expression for mutual inductance of a pair of coil.
 - (d) Discuss various losses in Transformer.
4. Attempt any *one* of the following : 10
- (a) Obtain an expression for the average power in an a.c. circuit and hence define power factor.
 - (b) Explain permeability and susceptibility. When magnetic intensity of 10 AT/m is applied to a specimen, a magnetic induction 7×10^{-3} Wb/m² is produced in it. Find permeability and susceptibility. ($\mu_0 = 4\pi \times 10^{-7}$ H/m)