Vivekanand College, Kolhapur. (Autonomous) Department of Physics Internal Examination Notice 2019-20

Date: 15/01/2020

All students of class B.Sc. I, B.Sc. II and B.Sc. III are hereby noticed that the second term internal evaluation examination is scheduled as per following time table. Nature of question paper:

For B.Sc. I: Long answer question (Any one from given two questions) for 10 marks

Short answer question (Any two from given three questions) for 10 marks

For B.Sc. II : Long answer question (Any one from given two questions) for 10 marks

Short answer question (Any two from given three questions) for 10 marks

For B.Sc. II (Astro) : Long answer question (Any one from given two questions) for 10 marks Short answer question (Any two from given three questions) for 10 marks

For B.Sc. III: Long answer question (Any one from given two questions) for 10 marks

Short answer question (Any two from given three questions) for 10 marks Internal Evaluation Examination 2019-20. SEM II, SEM IV and SEM VI Time Table

| Sr. No. | Class | Paper | Date | Time |
|---------|-------------------------|-------------------------|------------|----------------------|
| 1. | B.Sc. I | Paper II | 27/01/2020 | 11:00 am to 12:00 pm |
| 2 | B.Sc. II | Paper IV | 27/01/2020 | 11:00 am to 12:00 pm |
| 3 | B.Sc. II (Astrophysics) | Paper II | 28/01/2020 | 11:00 am to 12:00 pm |
| 4 | B Sc. III | Paper VII (section I) | 29/01/2020 | 11:00 am to 12:00 pm |
| | | Paper VII (section II) | _ | 01:00 am to 02:00 pm |
| | | Paper VIII (section I) | 30/01/2020 | 11:00 am to 12:00 pm |
| | | Paper VIII (section II) | _ | 01:00 am to 02:00 pm |



Vivekanand College, Kolhapur

B.Sc. (Part-I) Semester-DInternal Examination 2019-20 Subject : Physics Title : Electricity, Magnetism and electromagnetic theory Paper No. II Sub. Code : DSC -1001 B

Day & Date : Friday, 14/02/2020 Time : 10:30am to 11:10am

Instructions : 1) All questions are compulsory.

- 2) Figures to the right indicate full marks.
- 3) Draw neat labeled diagrams wherever necessary.
- 4) Use of log table/calculator is allowed.

Q.1 Select correct alternative.

- 1. The line integral of electric force per unit charge over a closed path is -----
 - a) emf b) potential difference c) electric flux d) Magnetic Induction
- Self inductance per unit length of a long solenoid with n turns per unit length and cross-sectional area A is,---
 - a) $\mu_0 n A$ b) $n^2 A$ c) $\mu n^2 A$ d) $\mu_0 n$
- 3. The mutual inductance per unit length of two windings with n1 and n2 turns per unit length over a frame of cross sectional area A is,------

a)
$$\frac{\mu_o n_1 n_2}{A}$$
 b) $\frac{\mu_o A}{n_1 n_2}$ c) $\frac{\mu_o n_1}{n_2 A}$ d) $\mu_o n_1 n_2 A$

- 4. The relation between magnetic induction B, magnetizing filed and intensity of magnetization is
 -
- a) B= μ₀(H + M)
 b) H= μ₀(B + M)
 c) M= μ₀(H + B)
 d) B=(H + M)
 5. Magnetic susceptibility.....
 a) B/H
 b) H/M
 c) MH
 d) M/H

Q.2) Attempt any ONE.

1. Derive an expression for energy stored per unit volume in magnetic field.

2. Obtain an expression for magnetic filed due to straight conductor of finite length. Hence obtain an expression for magnetic field due to infinite straight conductor.

Q.3) Attempt any ONE.

- 1. What is self inductance? Obtain an expression for self inductance of solenoid.
- 2. State and explain Biot- Savart's law .



Total Marks : 20

(05)

(10)

(05)

"Dissemination of Education for Knowledge, Science and Culture" - Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Viyekanand Shikshan Sanstha's

Vivekanand College, Kolhapur

(Autonomous)

Department of Physics

Internal exam

B.Sc.I Sem II

Date:- 27/01/2020

Attendance Sheet

| Roll No, | Name Of The Students | Signature |
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Q.2 2) It states that the magnetic induction (dB) at a point (P) due to an element (AB) of a point (r) due to an element (map of a) its length (s) conductor is directly proportional to (a) its length (s) (b) the current (i) passing through it. (c) Sino, where a is the angle made by the line joining, the centre (a) of the element to P and (d) inversity proportional to the square (r) of the distance (r) of the point (P) from the element dB & i.dl.sind $\frac{dB}{4T} = \frac{llo}{3} \cdot \frac{idl.sin0}{3}$ dB = 10 j. der. sind 411 y3 : dB = No i. dr. 7 4TT ys cia where of = T. The magnetic induction dB acts in the direction perpendicular to the plane ADP, containing the element (AD) and the point CP) and its sense is given by the right hand rule

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Q.2) 1) when a circuit is switched on it the current in the circuit grows from 0 to I where I is steady maximum emf & is developed in the circuit is given by, E = -L dIwhere L is the self inductance of the circuit work done against this back emf is regarded as energy stored in the magnetic field. This energy is recovered when the circuit is switched off. . Work done per unit time is, $\frac{dw}{dt} = -EI = -LI dI$. Total work done to set up final current I is $W = \int \frac{dW}{dt} dt = \int \frac{dT}{dT} \frac{dT}{dt} dt = \int \frac{T}{T} \frac{dT}{dT} \frac{dT}{$ 10 Thus total work done depends only on the self inductance and final current. It does not depend on the time interval required to grow the current to its Final Steady Value $\phi = LT$ Also, & can be expressed in terms of magnetic field 08. $\phi = \int \vec{B} \cdot d\vec{s} = \int (\nabla x \vec{A}) d\vec{s}$ where, A is vector magnetic potential at the surfaces of the loop bounded by the conductor C. $B = \nabla \times \vec{A}$ Now applying Stoke's theorem on RHS of eq grounder

 $\Phi = \int \vec{B} \cdot d\vec{s} = \int \vec{A} \cdot d\vec{z} \qquad (4)$ From equations (2) and (4) we get, $LI = \phi \overrightarrow{R} \cdot d\overrightarrow{I}$ $W = \frac{1}{2} I \cdot \oint \vec{A} \cdot d\vec{\lambda} = \frac{1}{2} \oint \vec{A} \cdot \vec{T} dL$ 5 = 1 (A.J.dv -This equation gives work done in terms of volume current density J. Q2> 3> Biot - Savart's Law > Biot Savart's law states that the magnetic field at a point due to a small element of current carrying conductor is directly proportional to the length of the element, directly proportional to the current flowing through It, directly proportional to the sine of the angle between the element and the line joining the centre of the element to the point and inversely proportional to the square of the distance of the point from the centre of element. DU i.e. db & Idlsing r² = K Idisine dB