BSC. PART - II EXAMINATION - 2009

PHYSICS HONOURS PAPER III

Q.-No. 1 is compulsory , Answer four Questions, selecting two each from Group –A and Group – B

1. Select the correct choice of the following:

(a) Set of coordinates required in spherical polar coordinate system is:
(i) r, 0 (ii) x, y, z (iii) x, y (iv) r, 0, ϕ

(b) If $\vec{A}$ is a constant vector, div $\vec{A}$ is equal to: (i) 1 (ii) 0 (iii) $\vec{A}$ (iv) A

(c) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ then $\vec{\nabla} \cdot \vec{r}$ is equal to: (i) 0 (ii) 1 (iii) 2 (iv) 3

(d) According to Lorentz transformations:

(i) $x' = \dfrac{x + vt}{\left(1 - v^2/c^2\right)^{1/2}}$ (ii) $\dfrac{x - vt}{\left(1 - v^2/c^2\right)^{1/2}}$

(iii) $x = \dfrac{x' + vt}{\left(1 - v^2/c^2\right)^{1/2}}$ (iv) $x = \dfrac{x' - vt}{\left(1 - v^2/c^2\right)^{1/2}}$

(e) In time dilation every clock appears to be slowed down by a factor:

(i) $1 - v^2/c^2$ (ii) $1 + v^2/c^2$ (iii) $\left(1 - v^2/c^2\right)^{1/2}$ (iv) $\left(1 - v^2/c^2\right)^{-1/2}$

(f) At very low temperature a semiconductor behaves as:
(i) Conductor (ii) Insulator (iii) Super conductor (iv) None of these

(g) Transistor is regarded as a:
(i) Four pole network (ii) Three pole network
(iii) Two pole network (iv) None of these

(h) Tank circuit of an oscillator consists of:
(i) An inductance in parallel with a resistance
(ii) An inductance in series with a resistance
(iii) An inductance in parallel with a capacitor
(iv) An inductance in series with a capacitor

(i) Decimal form of binary number 10111 is :
(i) 24 (ii) 23 (iii) 22 (iv) 21

(j) ROM is a memory device intended to be written:
(i) Only once at the time of manufacture (ii) In the field by the use
(iii) As many times as disired (iv) None of these

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GROUP - A

2. State and prove Stoke's theorem. Discuss its significance. Explain Line, Surface and Volume Integrals.
3. Describe Michelson-Morley Experiment and discuss its negative result.
4. Discuss the variation of mass with velocity and hence establish the mass-energ relation.
5. Write notes on any two of the following:
   (a) Scalar and vector quantities (b) Galilean transformation (c) Aberration of ligh

GROUP - B

6. Explain the I-V characteristics of p-n junction diode and its action as a rectifier.
7. Explain, with circuit diagram, the working of R-C coupled amplifier. Descuss it frequency response.
8. What are logic gates ? Describe AND, NAND and NOR gates with truth tables
9. Write notes on any two of the following:
   (i) JK flip-flops (b) Characteristics of BJT (c) Boolean Algebra (d) Thevenin's theorem

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