

BSC. PART - II EXAMINATION - 2010

PHYSICS HONOURS PAPER III

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

I. Select the correct choice of the following:

(a) If \vec{A} is an irrotational vector field, then

(i) $\text{div } \vec{A} = 0$ (ii) $\text{Curl } \vec{A} = 0$ (iii) Both (i) and (ii) (iv) None of these

(b) If L_0^3 is the rest volume of a cube then the volume viewed from a reference

frame moving with a constant velocity v along an edge of the cube is

(i) L_0^3 (ii) $L_0^3(1-\beta^2)^{\frac{1}{2}}$ (iii) $L_0(1-\beta^2)^{\frac{3}{2}}$ (iv) $L_0^3(1-\beta^2)^{-\frac{1}{2}}$

Where $\beta = v/c$

(c) A frame of reference is said to be an inertial frame if:

(i) It is at rest relative to a fixed star
(ii) It moves with a constant velocity relative to a fixed star
(iii) Both (i) and (ii) (iv) None of these

(b) If α and β are the two parameters of a BJT transistor then.

(i) $\alpha > \beta$ (ii) $\beta > \alpha$ (iii) $\alpha = \beta$ (iv) None of these

(e) Divergence of a vector field is always: (i) A scalar field

(ii) A vector field (iii) Both Sclar and Vector field (iv) None of these

(f) A relativistic particle has its rest mass M_0 If the particle moves with a

velocity $\sqrt{3}/2$ times the velocity of light, then its mass in motion will be:

(i) M_0 (ii) $\frac{M_0}{2}$ (iii) $\frac{2}{\sqrt{3}}M_0$ (iv) $2M_0$

(g) The set of co-ordinates required in cylindrical co-ordinate system is:

(i) (r, θ) (ii) (r, θ, z) (iii) (r, θ, ϕ) (iv) (x, y, z)

(h) A zener diode is widely used in

(i) Voltage regulation circuits (ii) Amplifier circuits
(iii) Oscillator circuits (iv) Modulators

(i) In an amplifier circuit the load resistance has a:

(i) Small value (ii) Very large value (iii) Moderate value (iv) None of these

(j) A NOT logic circuit has <http://www.tmbuonline.com>

(i) One input and one out-put (ii) Two inputs and one out-put
(iii) Two inputs and two out-puts (iv) None of these

GROUP-A

2. State and prove Gauss's divergence theorem.
Prove that : $\text{Curl Curl } \vec{A} = \text{grad div } \vec{A} - \nabla^2 \vec{A}$
3. Write Laplace's equation in spherical polar co-ordinates and find its general solution.
4. What are the postulates of special theory of relativity ? Apply the postulates to deduce the Lorentz transformation equations and discuss the length contraction.
5. Write notes on any two of the following (a) Relativistic addition of velocities
(b) Doppler's effect in light (c) Aberration of light

GROUP-B

6. What is Barkhausen Criterion for sustained oscillations ? Discuss the construction and working of a Hartley oscillator and derive the expression for the frequency of the oscillation.
7. (a) State and prove Norton's theorem.
(b) Find the condition to transfer maximum power from a network to a load.
8. Explain the structure of a JFET and draw its characteristic curves. How does a FET differs from that of a junction transistor ?
9. Write notes on any two of the following (a) Hybrid parameters of a transistor
(b) Zener diode (c) Basic principle of an amplifier (d) JK flip-flops

<http://www.tmbuonline.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से