

## SAMPLE MOCK TEST ON IIT-JAM / JEST / TIFR-GS PHYSICS

Full Marks: 10

Time : 30 minutes

1. The Fourier series for the function  $f(x) = x + x^2, -\pi < x < \pi$  will consist of  
a. Only sine terms      b. Only cosine terms      c. Both sine & cosine terms      d. Only constant terms
2. Which of the following statements is correct for the real and imaginary parts of  $\sqrt{i}^{\sqrt{i}}$  ?  
a. Real part contains cosine function      b. Real part contains sine function  
c. Imaginary part contains cosine function      d. Both options b and c are correct
3. There are three planets moving in circular orbits about a star at radii R, 9R and 16R respectively. They are along a straight line at time  $t_0$  and the period of revolution of the closest planet is T. After what time of  $t_0$  they would again be along a straight line?  
a. 216T      b. 512T      c. 1728T      d. 3456T
4. If  $C_1$  and  $C_2$  represent the specific heat of a liquid and its saturated vapour, and L represents the latent heat of vaporization, then which one is the correct relation amongst them?  
a.  $C_2 - C_1 = \frac{dL}{dT} - \frac{L}{T}$       b.  $C_1 - C_2 = \frac{dL}{dT} + \frac{L}{T}$       c.  $C_2 + C_1 = \frac{dL}{dT} - \frac{L}{T}$       d.  $C_2 + C_1 = \frac{dL}{dT} + \frac{L}{T}$
5. The value of electric field in a given region space is found to vary with the distance from the origin as  $\vec{E} = kr^3\hat{r}$ , where k is a constant. The charge density of the given region of space is  
a.  $5\epsilon_0 kr^2$       b.  $3\epsilon_0 kr^2$       c.  $5\epsilon_0 kr^4$       d.  $3\epsilon_0 kr^4$
6. A long solenoid of radius 'a' is driven by an alternating current such that the magnetic field inside is  $\vec{B}(t) = B_0 \cos \omega t \hat{k}$ . If a circular wire loop of radius 'a/2' and resistance R is placed coaxially within the solenoid, the induced current in it is  
a.  $\frac{\pi a^2 \omega}{4R} B_0 \sin \omega t$       b.  $\frac{\pi a^2 \omega}{R} B_0 \sin \omega t$       c.  $\frac{\pi a^2 \omega}{2R} B_0 \sin \omega t$       d.  $\frac{\pi a^2 \omega}{8R} B_0 \sin \omega t$
7. What will be the separation between the two coherent sources of a biprism (made of glass having r.i 1.5) if its inclined planes make an angle of two degrees with the base and the slit source is 0.1 m away?  
a. 1.5 mm      b. 2.5mm      c. 3.5mm      d. 4.5mm
8. The wave function of a quantum mechanical particle is given as  $\varphi(x) = 3\varphi_1(x)/5 + 4\varphi_2(x)/5$ , where  $\varphi_1(x)$  and  $\varphi_2(x)$  are eigenfunctions with corresponding energy eigenvalues -1eV and -2eV respectively. The energy of the particle in the state  $\varphi$  is  
a. -41/25 eV      b. -11/5 eV      c. 36/25 eV      d. -7/5 eV
9. Quantum statistics is applicable to group of particles having  
a. less number density      b. High number density      c. Zero spin      d. chemical interactions
10. The half life of a radioactive source is 9 days. The fraction of nuclei which remain un-decayed after 3 days is  
a. 7/8      b. 1/3      c. 5/6      d.  $1/2^{1/3}$

Answer Keys:

1.	2.	3.	4.	5.
6.	7.	8.	9.	10.