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1367

Your Roll No.

B.Sc. (Hons.)/I

A

BIOCHEMISTRY : Paper III

(Physics)

(Admissions of 2000 and onwards)

Time : 3 Hours

Maximum Marks : 60

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Attempt any Five questions.

All questions carry equal marks.

1. (a) Give the theory of the compound pendulum. Show that the centre of oscillation and suspension of a given compound pendulum are interchangeable. What is the condition for minimum time period of a compound pendulum ? (8)
- (b) Find an expression for moment of inertia and radius of gyration for a rotating rigid body. Explain their physical significance. (4)
2. (a) Define coefficient of viscosity of a liquid. What are its dimensions and unit ? Deduce Poiseulle's

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formula for flow of a liquid through a horizontal tube explaining how the viscosity of a liquid can be determined with it. (10)

- (b) Calculate the work done in blowing a soap bubble of radius 4 cm. What additional work will be done if on further blowing its radius becomes 6 cms ? (2)
3. (a) Draw the common emitter circuit of a n-p-n transistor. Sketch and explain the input and output characteristics. How does the transistor act as an amplifier in this configuration ? (8)
- (b) What is meant by forward biasing and reverse biasing of a p-n junction diode ? Draw the V-I characteristics of the junction diode explaining why there is very small current in reverse bias. (4)
4. (a) Give with necessary theory Newton's ring method of determining wavelength of monochromatic light. (9)
- (b) In a Newton's ring experiment the diameter of the 15th ring was found to be 0.590 cm and that of the 5th ring was 0.336 cm. If the radius of the plano convex lens is 100 cms, calculate the wavelength of the light used. (3)

5. (a) What is a Zone plate ? Explain how a Zone plate acts as a convergent lens with multiple foci. Derive an expression for its focal length. (7)
- (b) Discuss the intensity distribution in Fresnel diffraction due to a straight edge. (5)
6. (a) State Bohr's postulates for the Hydrogen atom and derive an expression for the energy of the atom in its n th state. (10)
- (b) Find the wavelength of the spectral line that corresponds to a transition in Hydrogen from $n=10$ state to the ground state.
- Given $R=1.097 \times 10^7$. (2)
7. (a) Deduce the one dimensional time independent Schroedinger equation from first principles and explain the physical significance of the wave function in quantum mechanics. (9)
- (b) State Heisenberg's Uncertainty principle. A microscope using photons is used to locate an electron in an atom to within a distance of 0.2 Å. What is the uncertainty in the momentum of the electron ? Given $h = 6.626 \times 10^{-34}$. (3)

8. Write short notes on any two of the following :

- (i) Forced vibrations
- (ii) Laurent half shade polarimeter
- (iii) Millikan's determination of charge of electron
- (iv) Huygen's eyepiece
- (v) Jaeger's method for the determination of surface tension of a liquid. (6,6)