[This question paper contains 3 printed pages.]

Your Roll No. .....

5964 **B**

B.Sc. (Hons.)/I

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*) Define coefficient of viscosity of a liquid. What are its dimensions and unit ? Deduce Poiseulle's formula for flow of a liquid through a horizontal tube explaining how the viscosity of a liquid can be determined with it. 9

   (*b*) Draw the circuit diagram of a bridge rectifier with a π filter. 3

2. (*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*) State and prove theorem of parallel axes for moment of inertia. 4

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3. (*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

4. (*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

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*) 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 0.2A. What is the uncertainty in the momentum of the electron? Given $h = 6.626 \times 10^{-34}$. 3

7. (*a*) State Bohr's postulates for the Hydrogen atom and derive an expression for the energy of the atom in its *n*th state. 9

(*b*) Explain and derive Bragg's Law of X-ray diffraction for a crystalline solid. 3

8. Write short notes on any *two* of the following : 6,6

(*i*) Forced vibrations

(*ii*) Carey Foster's Bridge for measurement of low resistances.

(*iii*) Millikan's determination of charge of electron.

(*iv*) Michelson's interferometer and its uses.

(*v*) Jaeger's method for the determination of surface tension of a liquid.