AS–1450

B.Sc. (Part—III) Semester—V Examination
PHYSICS

Time : Three Hours]   [Maximum Marks : 80

Note :— (1) **ALL** questions are compulsory.

        (2) Draw neat diagram wherever necessary.

Constants :

Rest mass of an electron $m_0 = 9.11 \times 10^{-31}$ kg

Planck's constant $h = 6.63 \times 10^{-34}$ J.S

Velocity of light $c = 3 \times 10^8$ m/s.

1. (A) Fill in the blanks :

    (i) The wave function which satisfies the condition $\int \psi \psi^* dv = 1$ is called .... wave function.

    (ii) S.I. unit of hybrid parameter input impedance (h_i) is ....

    (iii) Nuclear forces are .... range forces.

    (iv) Phase shift between input and output of single stage CE amplifier is   2

 (B) Choose correct alternative :

    (i) The unit of conductance is :

        (a) Henry   (b) mho

        (c) ohm   (d) Farad

    (ii) The constant $\hbar$ is equal to :

        (a) $\dfrac{2\pi}{h}$ (b) $2\pi h$

        (c) $\dfrac{h}{2\pi}$ (d) $\dfrac{\pi}{2h}$

    (iii) The Planck's radiation law fits the experimental spectral distribution curve in :

        (a) Short wavelength range   (b) Long wavelength region

        (c) The entire wavelength range   (d) None of the above

(iv) The de-Broglie's relation is :

(a) $\lambda = \dfrac{C}{V}$ (b) $\lambda = \dfrac{h}{P}$

(c) $C = \dfrac{V}{\lambda}$ (d) $C = \dfrac{\lambda}{V}$ 2

(C) Answer in one sentence :

   (i) What is positive feedback ?

   (ii) What is black body radiation ?

   (iii) Write Schrodinger's time independent equation.

   (iv) What is thermal runaway ?   4

EITHER

2. (A) What is de-Broglie's hypothesis ?   2

(B) Find the de-Broglie's wavelength of an electron moving with velocity 1000 m/sec.   4

(C) Describe Davission and Germer experiment.   6

OR

3. (P) Describe gamma ray thought experiment to illustrate uncertainty principle.   6

(Q) Explain Wein's law of black body radiation.   2

(R) Obtain the relation between group velocity (V_g) and phase velocity (V_p). Show that for non dispersive medium both are same.   4

EITHER

4. (A) What is wave function ? Give its physical significance and limitations of wave function.   6

(B) Solve the Schrodinger equation for a particle in one dimensional rigid box. Find the eigen value and eigen function.   6

OR

5. (P) Derive Schrodinger time dependent equation.   5

(Q) What is (i) zero point energy (ii) tunneling effect ?   4

(R) Explain Eigen values and Eigen functions.   3

VTM—13406   2   (Contd.)

EITHER

6. (A) Explain the concept of space quantization and electron spin. 4

(B) Describe Stern-Gerlach experiment and discuss its result. 2

(C) What is L-S coupling ? 6

OR

7. (P) State properties of X-rays. Write down its applications. 6

(Q) State and explain Duane-Hunt's law. 4

(R) Distinguish between emission spectra and absorption spectra. 2

EITHER

8. (A) Describe the construction and working of nuclear reactor with its uses. 7

(B) Explain Pauli's neutrino theory of β-decay. 3

(C) Draw a labelled diagram of G.M. counter. 2

OR

9. (P) Define (i) Nuclear charge (ii) Nuclear radius. 3

(Q) What is Nuclear Fission ? 2

(R) State Gieger-Nuttal law. 2

(S) What is β-decay ? Explain three modes of β-decay. 5

EITHER

10. (A) Obtain two basic equations of hybrid parameters for transistor in CE mode. 4

(B) Draw hybrid equivalent circuit for CE amplifier. Obtain an expression for input impedance and current gain in CE amplifier. 6

(C) What is an operating point ? 2

OR

11. (P) State and explain different types of distortions in amplifier. 6

(Q) Explain Class A, Class B and Class C amplifier. 6

EITHER

12. (A) Explain with circuit diagram, the construction and working of phase shift oscillator. 5

(B) Explain construction and working of Astable Multivibrator. 5

(C) What is positive and negative feedback in amplifier ? 2

OR

13. (P) Explain construction and working of monostable multivibrator. 5

(Q) Explain construction and working of Weinbridge oscillator. 5

(R) State the advantages of negative feedback. 2