

EITHER

12. (a) What is an Oscillator? Explain the working of Hartley oscillator. 5
- (b) Draw neat circuit diagram of Colpitt's oscillator and explain its working. 5
- (c) Draw a neat circuit diagram of monostable multivibrator. 2

OR

13. (p) Explain the working of mono-stable multivibrator. 5
- (q) Explain working of phase shift oscillator. 5
- (r) Define :
- (i) Voltage feedback
- (ii) Current feedback. 2

B.Sc. (Part-III) Semester-V**5S : PHYSICS**

Time—Three Hours]

[Maximum Marks—80

- Note:—** (i) All questions are compulsory.
- (ii) Draw neat diagram wherever necessary.

1. (A) Fill in the blanks :

- (i) The relation is called as de Broglie's relation.
- (ii) The wave function which satisfies the condition of $\int \psi \psi^* dv = 1$ is called as wave function.
- (iii) In LC oscillator, the frequency of oscillation is given by
- (iv) GM counter is to be operated in 2

(B) Choose correct alternative :

- (i) Which of the following is known as the Schrodinger equation :
- (a) $E = h\nu$ (b) $E = m.c^2$
- (c) $\bar{H}\psi = E\psi$ (d) $\lambda = \frac{h}{p}$

(ii) In phase shift oscillator, the frequency determining elements are :

- (a) L and C (b) R, L and C
(c) R and C (d) None of the above

(iii) GM counter is a device to detect :

- (a) X-ray (b) mass
(c) charge (d) radiation

(iv) The hybrid parameter (h_{ie}) of circuit is :

- (a) Input impedance
(b) Output impedance
(c) Reverse voltage gain
(d) Output admittance.

2

(C) Answer in one sentence :

- (i) What is thermal runaway ?
(ii) Define mass defect.
(iii) What is feedback ?
(iv) What is fusion ?

4

OR

9. (p) What are the modes of beta-decay ? 3
(q) Explain beta decay process on the basis of Pauli's neutrino hypothesis. 4
(r) Give an account of proton-proton and Carbon-Nitrogen cycle in fusion. 5

EITHER

10. (a) Draw the circuit diagram of two stage RC coupled common emitter amplifier. 2
(b) Deduce an expression for voltage gain in mid frequency range of RC coupled amplifier. 4
(c) Discuss variation of gain of RC coupled amplifier in different frequency range. 4
(d) State advantages of RC coupling. 2

OR

11. (p) Obtain an expression for voltage gain and output impedance using hybrid equivalent circuit of CE amplifier. 6
(q) Explain internal and external noise in an amplifier. 6

EITHER

2. (a) On the basis of Einstein's photoelectric equation, explain the characteristics of photoelectric effect. 4
- (b) Show that the group velocity is equal to the particle velocity. 3
- (c) Describe thought experiment to prove the validity of Heisenberg's Uncertainty Principle. 5

OR

3. (p) What is Compton Effect ? What are modified and un-modified lines ? 3
- (q) Define :
- (i) Stopping potential
- (ii) Threshold frequency
- (iii) Photoelectric work function. 3
- (r) Describe single slit diffraction of electron to support Heisenberg's Uncertainty Principle. 6

EITHER

4. (a) Solve the Schrodinger equation for a particle in a three dimensional rigid box. Find the energy eigen values and eigen function. 8
- (b) Obtain quantum mechanical operator for :
- (i) Linear momentum
- (ii) Kinetic energy. 4

OR

5. (p) Deduce Schrodinger's time dependent wave equation. 5
- (q) Explain the phenomenon of tunneling. 3
- (r) Give physical significance of wave function ' Ψ '. 4

EITHER

6. (a) Explain the origin of continuous x-ray spectrum. 3
- (b) State and explain Daune-Hunt law. 3
- (c) What is Raman effect ? Describe an experimental arrangement to study it. 6

OR

7. (p) State any four applications of X-rays. 4
- (q) Give the importance of Moseley's law. 3
- (r) Explain L-S and j-j coupling schemes. 5

EITHER

8. (a) What is nuclear fission ? Explain chain reaction in nuclear fission. 4
- (b) Describe the construction and working of nuclear reactor. 5
- (c) Distinguish between nuclear fission and fusion. 3