

S.Y.B.SC. SEM – IV (2014 COURSE) : SUMMER - 2018
SUBJECT : PHYSICS: WAVES AND OSCILLATIONS (P-41)

Day : **Friday**
Date : **13/04/2018**

Time : **03.00 PM TO 05.00 PM**
Max. Marks: 40.

S-2018-0720

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate full marks.
- 3) Draw neat labeled diagrams **WHEREVER** necessary.

Q.1 Attempt any **TWO** of the following: **(10)**

- a) What is amplitude resonance? What is the condition for velocity resonance?
- b) The phase difference between two SHM'S perpendicular to each other and having equal period is $\pi/2$. What would be the resultant motion, if amplitude of SHM is not equal?
- c) Obtain expression for average power absorbed during the forced oscillations

Q.2 Attempt any **TWO** of the following: **(10)**

- a) Write a note on seismic waves.
- b) Describe one method used for production of ultrasonic waves
- c) The motion of an oscillator along the X-axis is determine by the equation $\frac{d^2x}{dt^2} + 4\frac{dx}{dt} + 8x = 20\sin 2t$, where the quantities are in SI units. If the motion starts from the origin, find period, frequency and quality factor of the system for the steady state oscillation.

Q.3 Attempt any **TWO** of the following: **(10)**

- a) Write a note on log decrement and quality factor
- b) Discuss phenomenon of sharpness of resonance and show that it depends on the damping factor.
- c) An object of mass 0.2 kg is hung from a spring whose force constant is 80 N/m. If it is subjected to a damping constant of 4 Ns/m, set up the differential equation for damped oscillations of the system and find the period of such oscillations.

Q.4 Attempt any **FIVE** of the following: **(10)**

- a) A condenser of capacity 2×10^{-6} F is discharged through a coil of resistance 2 Ω and inductance 0.1 H. Prove that the discharge is oscillatory.
- b) Explain what you understand by Doppler effect.
- c) Define damped harmonic oscillation. Draw curves showing over damped, critically damped and damped oscillatory motions of an oscillator.
- d) Draw power resonance curve and define the band-width of the power resonance curve.
- e) State magnetostriction effect help to produce ultrasonic waves.
- f) A wire of mass per unit length 0.5 g/cm is stretched between two clamps under tension of 2×10^6 dynes. If transverse waves are set up in the wire, calculate the velocity of waves.
- g) What is 'Red shift'? Explain how it supports the theory of the expanding universe.

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