S.Y.B.SC. SEM – IV (2014 Course) : WINTER - 2018

SUBJECT : PHYSICS : WAVES & OSCILLATIONS (P – 41)

Day : Thursday
Date : 11/10/2018

W-2018-0813

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

N.B.:

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Draw neat labeled diagram wherever necessary.

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

a) Obtain the expression for the velocity of transverse waves on a stretched string.

b) An alternating e.m.f of peak value 200 V is applied across the series combination of an inductor of inductance 20 mH, a capacitor of capacitance 2μF and resistance 50 Ω. Determine resonant frequency, quality factor and bandwidth.

c) Obtain the resultant path of two SHM's mutually perpendicular to each other and having frequency ratio 1: 1.Also check cases for $\phi = 0$ and $\phi = 1$

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

a) In the experiment for measuring the intensity of just audible sound from the source of sound having frequency 2730 Hz at the distance 820 meter, the calculated intensity was 4.26×10^{-6} Watts/cm^2 in still air. Determine the amplitude of vibration of air particles assuming all the energy from the source is radiated as sound.(Given: Density of air is 0.001293 gm/cm^3 and velocity of sound is 3.44×10^4 cm/s)

b) A particle is subjected to two rectangular directions such that the displacement at any instant is given by $x = 2 \sin(\omega t + \pi/4)$ and $y = 2 \sin \omega t$. find the nature and equation of the path.

c) The equation of forced oscillations is given by $4\frac{d^2x}{dt^2} + 3\frac{dx}{dt} + 36x = 2.7 \sin 3t$.
Determine the amplitude and phase difference between the periodic force.

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

a) Show that Doppler effect in sound is asymmetric in nature.

b) What are Lissajous figures? State the methods to obtain them. Explain any one method to obtain it.

c) What do you mean by wave velocity and particle velocity. Show that wave velocity, $c = \frac{\omega}{k}$

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

a) Write applications of resonance.

b) The equation for critically damped motion is given in the form
$5\frac{d^2x}{dt^2} + R\frac{dx}{dt} + 20x = 0$. Determine value of R.

c) Draw curves showing overdamped, critically damped and damped oscillatory motion of an oscillator.

d) State two points of difference between damped oscillations and forced oscillations.

e) Determine reverberation time.

f) The velocity of sound in water of density 1000 kg/m^3 is 1500m/s. Determine bulk modulus of elasticity.

g) State any two applications of Doppler effect.

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