PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2022
(Fourth Semester)

Branch –**MATHEMATICS**

MECHANICS-II(DYNAMICS)

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 When the velocity $\bar{v}$ in terms of its components in two _____ directions.
(i) Parallel (ii) equal
(iii) Perpendicular (iv) not equal

2 If $\overline{v_1}$ and $\overline{v_2}$ are of equal magnitude, say v then _____.
(i) $2v\cos\alpha/2$ (ii) $2v\cos\alpha/2$
(iii) $2v^2\cos\alpha/2$ (iv) $2v^2\cos\alpha/2$

3 If m is the mass of the particle and $\bar{v}$ its velocity then $m\bar{v}$ is called the _____.
(i) Linear momentum (ii) Linear
(iii) motions (iv) force

4 _____ is a force which comes into play when an elastic body is the deformed by application of forces.
(i) Tension (ii) Hooke's law
(iii) Reaction (iv) Poundal

5 State the Hooke's law_____.
(i) $T=\lambda\frac{x-a}{a}$ (ii) $T=\lambda\frac{x+a}{a}$
(iii) $T=\lambda\frac{x-b}{b}$ (iv) $T=\lambda\frac{x+b}{b}$

6 _____ is the joule of work done by 1 newton in moving the particle through 1 metre.
(i) Joule (ii) work
(iii) metre (iv) dyre

7 When $m\bar{v}$ is a constant vector, that is the linear momentum is conserved. Thus we obtain this called_____.
(i) Principle of conservation momentum (ii) momentum
(iii) work (iv) Joul

8 When the explosive charge in a gun forms a large_____
(i) amount of gas (ii) moment
(iii) Particle (iv) amount

Cont...

9 The maximum distance through which the particle moves on either side of mean position is called

(i) Amplitude (ii) Range

(iii) Vibration (iv) Epoch

10 The number of oscillations per second is called_____.

(i) frequency (ii) phase and epoch

(iii) motions (iv) amplitude

SECTION - B (25 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a If a point moves in a straight line with uniform acceleration and coves successive equal distance in times t_1,t_2,t_3 then show that $\frac{1}{t_1}+\frac{2}{t_2}+\frac{3}{t_3}=\frac{3}{t_1+t_2+t_3}$.

OR

b Calculate A train moving at 30m/ sec reduces to speed to 10m/sec in a distance 240m . At what distance will the train come to stop. If the brake power increased $12\frac{1}{2}$ % show that the train will stop in a total distance of 240 m.

12 a Explain Newton's seconds law motion.

OR

b Describe the magnitude and direction of the resultant force $\overline{F_1}$ and $\overline{F_2}$.

13 a Show that when a particle is subject to the action of conservative forces, the increase in k.E in an interval is equal to the work done in that interval.

OR

b Prove that A body is projected along a rough inclined plase straight up with Kinetic energy E show that the work done friction before the body comes to rest $\frac{E\mu Cos^2}{Sin^{2+}\mu Cos^2}$.

14 a Explain Newton's experimental law.

OR

b When two smooth spheres collide directly to find the impulse to each sphere and the change in the total Kinetic energy of the spheres .

15 a Show that the resultant motion of two simple harmonic motions of the same period along perpendicular line is an ellipse.

OR

b Calculate a particle is moving with S.H.M moving from mean position to one extreme position at three consecutive seconds x_1,x_2,x_3 showing its period is $2\pi/\cos^{-1}\left\{(x_1+x_3)/2x_2\right\}$.

SECTION -C (40 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 8 = 40)

16 a Describe the speed of a train increases at a constant rase from , and then remains constant for an interval and decreases to constant rase If s is the total distances prove index total time T is $T=\frac{S}{v}+\frac{v}{2S}\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)$.

OR

b Prove that train moves in straight line with uniform acceleration and describe distance a and b is successive intervals of duration t_1& t_2. Show that $\frac{2(bt_1 - at_2)}{l_1 t_2 (t_1 + t_2)}$

17 a Derive plane of motion a particle interms of radial and transverse components.

OR

b Discuss the magnitude of the resultant of two given forces P, Q is R. If G is doubled, then R is doubled. If Q is reversed then also R is doubled show that $P:Q:R = \sqrt{2}:\sqrt{3}:\sqrt{2}$.

18 a Discuss the car of mass 1 tonne attains a maximum speed of 45 km p.h when freely running down as in cline of 1 in 10. what power must engine develop to take incline of 1 in 20with the same speed both cases the resistance of the same.

OR

b Explain the principle of conservation of energy.

19 a Prove that when two spheres of equal masses m collide directly the velocities of the sphere are interchanged if e =1.

OR

b Explain oblique impact of a smooth sphere on a plane.

20 a A particle moves along a circle with uniform speed then show that the motion of projection of a fixed diameter is simple harmonic.

OR

b Explain two bodies of masses m and m' are attacked to the lower end of an elastic string whose upper and is fixed and hang at rest m' falls of show that the distances of m from the upper and of the string at time t is $a + b + c \cos \sqrt{g/b}\, t$.

Z-Z-Z

END