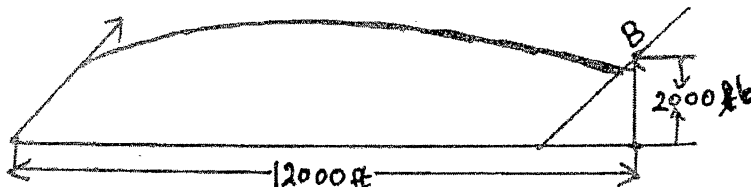


15. a. Explain the application of the principle of conservation of energy.
(OR)
b. Find the approximate solution for simple pendulum

SECTION-C (5x8 =40)
Answer All the Questions
All Questions Carry Equal Marks

16. a. Determine the position, velocity and acceleration of a particle in rectilinear Motion
(OR)
b. A projectile is fired with an initial velocity of 800 ft/s at a target B located 2000 ft above the gun A and at a horizontal distance of 12000 ft. Neglecting air resistance. Determine the value of the firing angle α .



17. a. Discuss about Linear momentum and angular momentum and their conservation principles.
(OR)
b. Explain about Newton's Law of Gravitation with an example.
18. a. Explain the work of the force exerted by a spring.
(OR)
b. Discuss about the conservative forces and conservation of energy with example for each.
19. a. Explain the oblique central impact with an example.
(OR)
b. A ball is thrown against a frictionless vertical wall. Immediately before the ball strikes the wall, its velocity has a magnitude v and forms an angle of 30° with the horizontal. Knowing that $e = 0.90$, Determine the magnitude and direction of the velocity of the ball as it rebounds from the wall.
20. a. Find the displacement, velocity and acceleration of the simple harmonic motion. Also find the natural frequency of the vibration.
(OR)
b. Explain the free vibrations of rigid body with example.

2-2-2

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2022
(Third Semester)

Branch – MATHEMATICS

PARTIAL DIFFERENTIAL EQUATIONS AND FOURIER TRANSFORM

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 The complete integral of the equation $(1 - x)p + (2 - y)q = 3 - z$ is
 - (i) $z = (1 - x)a + (2 - y)b$
 - (ii) $3 - z = (1 - x)a - (2 - y)b$
 - (iii) $z = ax + by - a - 2b + 3$
 - (iv) $z = ax + by - a - 2b$
- 2 The solution of $(D^2 - 5DD' + 6D'^2)z = 0$ is = _____
 - (i) $f_1(y + 2x) + f_2(y + 3x)$
 - (ii) $f_1(y - 2x) + f_2(y - 3x)$
 - (iii) $f_1(y - 2x) + f_2(y + 3x)$
 - (iv) $f_1(y + 2x) + f_2(y - 3x)$
- 3 Which one of the following is an even function?
 - (i) $x^3 \cos x$
 - (ii) $x^2 \cos x$
 - (iii) $x^2 \sin x$
 - (iv) $x^2 \tan x$
- 4 $\mathcal{F}\{f'(x)\} =$ _____
 - (i) $-iw\mathcal{F}\{f(x)\}$
 - (ii) $iw\mathcal{F}\{f(x)\}$
 - (iii) $w\mathcal{F}\{f(x)\}$
 - (iv) $i\mathcal{F}\{f(x)\}$
- 5 One-dimensional heat equation is
 - (i) $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$
 - (ii) $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial t^2}$
 - (iii) $\frac{\partial u}{\partial x} = c^2 \frac{\partial^2 u}{\partial x^2}$
 - (iv) $\frac{\partial u}{\partial t} = x^2 \frac{\partial^2 u}{\partial x^2}$

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Form a partial differential equation by eliminating the arbitrary function g from the relation $z = x^2 + 2g\left(\frac{1}{y} + \log x\right)$.
OR
b Solve $p^2 + q^2 = x^2 + y^2$.
- 7 a Find the characteristic of the equation $3u_{xx} + 10u_{xy} + 3u_{yy} = 0$ when it is of hyperbolic type.
OR
b Solve $(D^2 - 3DD' + D'^2)z = \sin x \cos y$.
- 8 a Obtain the Fourier series of the function $f(x) = |x|, -\pi < x < \pi$.
OR
b Find the Fourier coefficients of the periodic function $f(x) = \begin{cases} -k & \text{if } -\pi < x < 0 \\ k & \text{if } 0 < x < \pi \end{cases}$ with period $f(x + 2\pi) = f(x)$.

Cont...

