



Date: 26-04-2018

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART – A

Answer ALL questions:

(10 X 2 = 20)

1. Find the equation to the plane through (3,4,5) parallel to the plane $2x + 3y - z = 0$.
2. Find the equation of the line joining the points (2, 5, 8) and (-1, 6, 3).
3. Find the equation of the sphere which has its centre at the point (1, 2, 3) and radius 4 units.
4. Find the equation of the tangent plane to the sphere $x^2 + y^2 + z^2 + x + y + z = 20$ at the point (1,2,3)
5. Define odd and even functions.
6. Find the Fourier coefficient a_0 for the function $f(x) = \frac{1}{2}(\pi - x)$, $0 \leq x \leq 2\pi$.
7. Find the number of all divisors of 360.
8. State Wilson's theorem.
9. If a, b, c are positive numbers and $a < b$, prove that $\frac{a+x}{b+x} > \frac{a}{b}$.
10. State Weirstrass inequalities.

PART – B

Answer any FIVE questions:

(5 X 8 = 40)

11. Find the equation of the plane passing through the points (-1, 3, 2), and perpendicular to the two planes $x + 2y + 2z = 5$, $3x + 3y + 2z = 8$.
12. Find the image of the point (1, -2, 3) in the plane $2x - 3y + 2z + 3 = 0$.
13. Find the equation of the sphere which has its centre at the point (6, -1, 2) and touches the plane $2x - y + 2z - 2 = 0$.
14. Find the Fourier series for the function $f(x) = x^2$ in the interval $-\pi < x < \pi$.
15. Find a sine series for the function $f(x) = c$ in the interval $(0, \pi)$.
16. Find the remainder when 2^{46} is divisible by 47.
17. Show that if a, b, c are positive unequal quantities then $ax^{b-c} + bx^{c-a} + cx^{a-b} > a + b + c$.
18. If x and y are positive quantities whose sum is 4, show that $\left(x + \frac{1}{x}\right)^2 + \left(y + \frac{1}{y}\right)^2 \geq 12\frac{1}{2}$.

PART- C

Answer any TWO questions:

(2 X 20 = 40)

19. a) Find the equation of the plane passing through the points (3, 1,2) and (3, 4, 4) and perpendicular to the plane $5x + y + 4z = 0$.

b) Prove that the lines $\frac{x+1}{-3} = \frac{y+10}{8} = \frac{z-1}{2}$, $\frac{x+3}{-4} = \frac{y+1}{7} = \frac{z-4}{1}$ are coplanar.

(10 + 10)

20. a) Find the equation of the sphere which touches the sphere

$x^2 + y^2 + z^2 - 6x + 2z + 1 = 0$ at the point (2, -2,1) and passes through the origin.

b) Find the equation of the sphere through the four points

(2,3,1), (5, -1, 2), (4,3, -1) and (2,5,3).

(10 + 10)

21. a) Find in the range $-\pi$ to π , the Fourier series for $f(x) = \begin{cases} 1+x & 0 < x < \pi \\ -1+x & -\pi < x < 0 \end{cases}$

b) Prove that $13^{2n+1} + 9^{2n+1}$ is divisible by 22

(12 + 8)

22. a) Show that the 8th power of any number is of the form $17m$ or $17m \pm 1$.

b) Prove that $8xyz < (y+z)(z+x)(x+y) < \frac{8}{3}(x^3 + y^3 + z^3)$.

(10 + 10)
