Total No. of printed pages = 9

END SEMESTER EXAMINATION - 2019

Semester : 3rd (Old)

Subject Code : Sc-303

MATHEMATICS - III

Full Marks – 70

Time–Three hours

The figures in the margin indicate full marks for the questions.

PART – A

Marks – 25

1. Fill in the blanks : $1\times10=10$

(a) If the position vector of a point $(-4, -3)$ be $\vec{a}$, $|\vec{a}| =$ _____.

(b) The position vector of the mid-point of the vector joining the points $P(2i - 3j + 4k)$ and $Q(4i + j - 2k)$ is _____.

(c) If the height of 5 persons are 144 cm, 152 cm, 150 cm, 158 cm and 155 cm respectively then the mean height is _____.

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(d) The mode of the observations 120, 110, 130, 110, 120, 140, 130, 120, 140, 120 is _____.

(e) The mean deviation from the mean from the observations 22, 24, 30, 27, 29, 31, 25, 28, 41, 42 is _____.

(f) The probability of drawing a queen from a pack of cards is _____.

(g) The distance between the points A(2, 1, 2) and B(– 1, – 3, 2) is _____.

(h) The position vector of the point A(2, –1, 3) is _____.

(i) The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2 + \frac{dy}{dx} + 5y = 0$ is _____.

(j) The solution of the equation $\frac{d^2y}{dx^2} + 9y = 0$ is _____.

2. Answer true or false : 1×10=10

(a) The roots of the equation $x^3 + x + 2 = 0$ are the co-ordinates of the point at which the curve meets the x-axis.

(b) The equation $2x^2 + 3x + 1 = 0$ has real roots.

(c) The equation $\tan x = 1$ has infinite number of roots.

(d) The maximum number of points at which the equation $x^3 + 3x^2 + 2x + 5 = 0$ is three.

(e) If a line passes through three given points, then the points are said to be collinear.

(f) The magnitude of a unit vector is never equal to one.

(g) The differential equation of the type $\frac{dy}{dx} + Py = Q$ is a linear differential equation.

(h) If the cross product of two vectors is zero, the vectors will be perpendicular to each other.

(i) In tossing a coin the probability of getting a head cannot be greater than one.

(j) If the dot product of two vectors is zero, the vectors will be perpendicular to each other.

3. Choose the correct answer : 1×5=5

(a) The degree of the differential equation $\frac{d^2y}{dx^2}+9y=0$ is

(i) 1 (ii) 2

(iii) 0 (iv) 3

(b) The magnitude of the vector $4i+3j+5k$ is

(i) $\sqrt{2}$ (ii) $5\sqrt{2}$

(iii) 1 (iv) 2

(c) The number of real roots of the equation $x^3=-1$ is

(i) 0 (ii) 1

(iii) 2 (iv) 3

(d) The primitive of $x\,dx+y\,dy=0$ is

(i) $x^2 = 2y$ (ii) $y^2=2x$

(iii) $x+y=c$ (iv) $x^2 + y^2 = c$

(e) The equation $y^2dx+(xy+x^2)dy = 0$ is

(i) linear (ii) homogenous

(iii) exact (iv) None of the above.

PART – B

Marks – 45

4. Form a differential equation corresponding to $y=e^{mx}$ by eliminating m. 2

5. Solve (any *three*) : 3×3=9

(i) $y\sqrt{1+x^2}dy+x\sqrt{1+y^2}dx=0$

(ii) $\frac{dy}{dx}=\frac{3xy+y^2}{3x^2}$

(iii) $\sec^2x\tan\ y\,dx+\sec^2y\tan\ x\,dy=0$

(iv) $\frac{dy}{dx}+y\tan x=\cos x$

(v) $y=px+\cos p$

6. Solve (any *one*) : 4

(i) $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 2e^{3x}$

(ii) $(D^2 - 4D + 3)y = x^3$

(iii) $(D^2 + 2D + 1)y = \sin 2x$

7. Answer any *two* questions : 5×2=10

(i) Draw the graph of the equation $\sin x = \cos x$; $0° \leq x \leq 180°$

(ii) Solve graphically $x^3 - 3x + 2 = 0$

(iii) If $y = a + \frac{b}{x'}$, find a and b given the following data :

X :	4	5	6	7	8
Y :	60.1	49.5	42.4	36.8	32.1

8. Answer any *three* questions : 3×4=12

(i) Calculate the mean and median of the following data :

Interval	Frequency
0 - 5	3
5 - 10	7
10 - 15	9
15 - 20	14
20 - 25	20
25 - 30	28
30 - 35	22

(ii) Find the standard deviation from the following data :

Class Interval	Frequency
10 - 20	4
20 - 30	24
30 - 40	21