RETEST/END SEMESTER EXAMINATION – 2019

Semester–2nd (Old)

Subject Code : Sc–202

MATHEMATICS – II

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 : $1 \times 10 = 10$

   (a) Distance between (3, 4) and (9, –1) is ————.

   (b) Locus of a point moving at equal distance from two given points P and Q is the perpendicular bisector of ————.

   (c) The ratio in which x-axis divides the line segment joining (4, 1) and (3, –5) is ————.

   (d) Centre of the circle $x^2 + y^2 - 10x + 8y + 1 = 0$ is ————.

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(e) Equation to the circle with centre (0, 0) and radius 4 is _____.

(f) Length of latus rectum of the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ is _____.

(g) $\lim\limits_{x\to 0}\frac{\sin 2x}{x}=$ _____.

(h) $\lim\limits_{x\to\infty}\frac{x^5-x^4-6}{x^5-6x+3}=$ _____.

(i) $\frac{d}{dx}\left(x^2+4\right)=$ _____.

(j) $\frac{d^2}{dt^2}\left(t^4+\sin t\right)=$ _____.

2. Write true or false : 1×10=10

(a) Gradient of the line $2x - 3y = 1$ is 2.

(b) Equation to the tangent to the circle $x^2+y^2=4$ at (2, 0) is $x = 2$.

(c) Equation to the straight line having x-intercept 3 and y-intercept 2 is given by $2x + 3y - 6 = 0$.

(d) Area of the triangle with vertices (1, 2), (3, 6) and (4, 4) is 4 unit.

(e) $\lim\limits_{x\to\alpha}\frac{x^n-a^n}{x-a}=na^{n-1}$

(f) If $f(x)=\frac{\cos x}{x}$, then $f(0)=1$

(g) $\frac{d}{dx}\sin 2x=\cos 2x$

(h) $\frac{d}{dx}e^x=e^x$

(i) $\int\sin x\,dx=x^2$

(j) $\int(2x+1)\,dx=x^2+x$

3. Choose the correct answer : 1×5=5

(a) Value of $\lim\limits_{x\to 0}\frac{\sin^2 x}{x}$ is

(i) 0

(ii) 1

(iii) ∞

(iv) None of these

(b) Value of $\lim_{x \to 1} \frac{x^2 + 3x - 4}{x^2 - 1}$ is

(i) $\frac{4}{3}$ (ii) $\frac{4}{5}$

(iii) 3 (iv) $\frac{5}{3}$

(c) Derivative of $y = 5x - 2$ with respect to x is

(i) 5 (ii) 1

(iii) -2 (iv) 0

(d) Derivative of $\frac{d}{dx} e^{4x}$ with respect to x is

(i) e^{4x} (ii) $4e^{4x}$

(iii) $-4e^{4x}$ (iv) e^x

(e) Value of $\int_1^3 (x^3 - 1)\,dx$ is

(i) $\frac{27}{4}$ (ii) 18

(iii) 3 (iv) 25

PART – B

Marks – 45

Answer any *five* questions.

4. (a) $f(x) = 2x^2 - 5$, $2 < x < 5$ 3

Find $f(0)$, $f(3)$, $f(\pi)$.

(b) Find equation to the line passing through (2,1) and

(i) (6, –5)

(ii) parallel to $2x + y = 9$

(iii) having x-intercept 5. 2+2+2=6

5. (a) Find distance of the point (1, 3) to the line $6x - 5y + 2 = 0$.

(b) Write gradient and intercept forms of the straight line $x + 4y - 3 = 0$.

(c) Find area of the triangle with vertices (4, –1), (2, 3) and (0, 0). 3+3+3=9

6. (a) Find equation to the line passing through (2, –1) and parallel to $3x + 4y - 3 = 0$. 3

(b) Find angle between the lines $x - 3y - 1 = 0$ and $2x + y + 5 = 0$. 3

(c) Find centre, diameter and radius of the circle $x^2 + y^2 - 2x - 4y - 4 = 0$. 3

7. (a) Find equation to the circle with diameter joining the points (4, 8) and (–2, 1). 3

(b) Trace the parabola $y^2 = -8x$. 3

(c) Find distance between the lines $2x + y + 1 = 0$ and $2x + y - 5 = 0$. 3

8. Find the limit : 2+2+2+3=9

(a) $\lim_{x \to -3} (x^4 - 1)$

(b) $\lim_{x \to 1} \frac{x^2 - 1}{x - 1}$

(c) $\lim_{x \to \infty} \frac{x^2 + 5x - 3}{3x^2 + 2}$

(d) $\lim_{x \to 2} \frac{x^2 - 3x + 2}{x^2 - 4}$

9. (a) Find the limit : 3+3=6

(i) $\lim_{x \to 0} \frac{\log (1 - x^3)}{\sin x^3}$

(ii) $\lim_{x \to 3} f(x)$ if $f(x) = x+1, \; x < 3$

$= x^2 - x - 2, \; x > 3$

(b) Evaluate : $\frac{d}{dx}\left(e^{x^2 \sin x}\right)$ 3

10. (a) Find $\frac{d^2y}{dx^2}$: 3+3=6

(i) $y = \log \tan \left(\frac{\pi}{4} + \frac{x}{2}\right)$

(ii) $y = \cos 3x$

(b) Find $\frac{dy}{dx}$: $x^y = y^x$ 3

11. Integrate : 3+3+3=9

(a) $\int 2x \sin x^2 \, dx$

(b) $\int x^3 \log x \, dx$

(c) $\int_0^4 (3x^2 - 1) dx$

12. (a) Integrate : 3+3=6

(i) $\int \cot^2 x \operatorname{cosec}^2 x \, dx$

(ii) $\int \frac{x+3}{x^2-5x+6} dx$

(b) Find the limit : 3

$$\lim_{x \to \infty} \left\{ \frac{1}{n+m} + \frac{1}{n+2m} + \frac{1}{n+3m} + ... + \frac{1}{n+nm} \right\}$$