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RETEST 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 : $1\times10=10$

   (a) The distance of the point (2, 3) from the origin is _____.

   (b) The slope of the line $4x + 3y - 5 = 0$ is _____.

   (c) The radius of the circle $x^2 + y^2 - 6x + 10y + 25 = 0$ is _____.

[Turn over

(d) The length of the latus rectum of the parabola $y^2 = 10x$ is _____.

(e) If $f(x) = 3\sin x - 4\sin^3 x$, then $f\left(\frac{\pi}{2}\right) =$ _____.

(f) $\lim_{x\to 0}\frac{\sin mx}{mx} =$ _____.

(g) $\frac{d}{dx}\left(\frac{4}{7}x^7 - \frac{2}{3}x^3\right) =$ _____.

(h) $\frac{d}{dx}\tan^{-1} x =$ _____.

(i) $\int(ax^3 + bx^2 + cx + d)\,dx =$ _____.

(j) $\int_1^2 (x^2 - 1)\,dx =$ _____.

2. Write true or false : 1×10=10

(a) The co-ordinates of the centroid of the triangle with vertices (2, –3), (–7, 4) and (5, –1) are (0, 0).

(b) The lines $4x - 3y - 5 = 0$ and $4x - 3y + 1 = 0$ are parallel.

(c) $16x^2 + 16y^2 - 8x + 16y + 5 = 0$ represents a circle.

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(d) The length of the major axis of the ellipse $9x^2 + 4y^2 = 36$ is 2.

(e) The function given by $f(x) = x^2,\ x < 3$
$= 6x - 9,\ x \geq 3$
is continuous at $x = 3$.

(f) If $f(x) = (1 + x)(1 + x^2)(1 + x^3)(1 + x^4)$, then $f'(0) = 1$.

(g) The slope of the tangent to the curve $y = x^3 - 2x + 1$ at $x = 1$ is $\frac{1}{3}$.

(h) $f(x) = 3x - x^3$ has the maximum value at $x = -1$.

(i) $\int \sec x\ dx = \log|\sec x + \tan x| + C$

(j) $\int_0^2 e^x\,dx = e^2$

3. Choose the correct answer : 1×5=5

(a) Eccentricity of the ellipse is $\frac{x^2}{25} + \frac{y^2}{9} = 1$ is

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

(iii) $\frac{3}{5}$ (iv) $\frac{4}{9}$

(b) The co-ordinates of any point on the circle $x^2 + y^2 = 4$ are

(i) $(\cos\alpha, \sin\alpha)$ (ii) $(4\cos\alpha, 4\sin\alpha)$

(iii) $(2\cos\alpha, 2\sin\alpha)$ (iv) $(-\cos\alpha, -\sin\alpha)$

(c) $\frac{d}{dx}(\sin x^2) =$

(i) $2x\cos x^2$ (ii) $2x\sin x^2$

(iii) $2x\cos x$ (iv) $2x\cos(2x)$

(d) $\lim_{x\to 5}\frac{x^2-25}{x-5} =$

(i) 0 (ii) ∞

(iii) 10 (iv) 5

(e) $\int\frac{dx}{1+x^2} =$ _____ $+ C$

(i) $\tan^{-1}x$ (ii) $\sin^{-1}x$

(iii) $\cos^{-1}x$ (iv) $\cot^{-1}x$

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PART – B

Marks – 45

4. (a) If $f(x) = x^2 + 2x^4$, show that $f(-x) = f(x)$. 2

(b) Find the limit (any *two*) : $3\times2=6$

(i) $\lim_{x\to 3}\frac{x^2+x-12}{x-3}$

(ii) $\lim_{x\to 1}\frac{x-1}{\sqrt{x-1}+\sqrt{x+1}}$

(iii) $\lim_{x\to\infty}\frac{3x^4-2x^2+1}{x^4+2x^2+1}$

(c) A function is defined as follows : 3

$f(x) = x^2$; $x \neq 2$

$= 2$; $x = 2$

Is $f(x)$ continuous at $x = 2$?

(d) Find $\frac{dy}{dx}$ (any *two*) : $3\times2=6$

(i) $x = \cos\theta + \theta\sin\theta$, $y = \sin\theta - \theta\cos\theta$

(ii) $xy = \sin(x+y)$

(iii) $y = \frac{1-\cos x}{1+\cos x}$

(e) Show that $f(x) = 1 + x + x^2 + x^3$ has neither maximum nor minimum values. 3

5. (a) Integrate (any *three*) : $3 \times 3 = 9$

(i) $\int (3 \sin x - 2 \cos x + 4 \sec^2 x - 5 \operatorname{cosec}^2 x)\, dx$

(ii) $\int \frac{1 - \sin x}{x + \cos x} dx$

(iii) $\int x \sec^2 x \, dx$

(iv) $\int_0^3 (x + 4) dx$

(b) Evaluate : $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\cos x}}{\sqrt{\cos x} + \sqrt{\sin x}} dx$ 3

(c) Find the area bounded by the curve $y = \sin x$, the x-axis and the ordinates at $x = 0$ and $x = \pi$. 3

6. (a) Find the co-ordinates of the point which divides the join of (4, 5) and (7, –1) internally in the ratio 1 : 2. 2

(b) Find the equation of the line passing through the points (3, –4) and (1, 2). 2

(c) Find the equation of the circle passing through the points (0, –3), (1, –2) and (5, –8). 3

(d) Find the co-ordinates of the focus, the equation of the directrix and the length of the latus rectum of $y^2 = 6x$. 3

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