FSD

Objective
Paper Code
8197

Intermediate Part Second FBD-41-21 Roll No. : _____

MATHEMATICS (Objective) Group – I

Time: 30 Minutes Marks: 20

Q.No.1 **You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.**

S.#	Questions	A	B	C	D
1	The lines represented by $ax^2+2hxy+by^2=0$ are parallel if:	$h^2-ab=0$	$h^2-ab>0$	$h^2-ab<0$	$h^2=a+b$
2	The slope intercept form of equation of line is:	$1=\frac{x}{a}+\frac{y}{b}$	$y=mx+c$	$y=\frac{x}{m}+c$	$y-y_1=m(x-x_1)$
3	Two lines ℓ_1 and ℓ_2 with slope m_1 and m_2 are parallel if:	$m_1=-m_2$	$m_1=m_2$	$m_1m_2=-1$	$m_1=\frac{1}{m_2}$
4	$x=5$ is not solution of inequality:	$x+4>0$	$2x+3<0$	$x-4>0$	$x+y>4$
5	The parametric equations $x=a\cos\theta$, $y=a\sin\theta$ represent equation of:	Circle	Ellipse	Hyperbola	Parabola
6	The length of tangent from $(0,1)$ to circle $x^2+y^2+6x-3y+3=0$ is:	2	-2	1	3
7	For parabola value of eccentricity e is:	$e=0$	$e<1$	$e>1$	$e=1$
8	$\hat{i}\cdot(\hat{j}\times\hat{j})=$:	1	$\hat{i}$	0	2
9	If $\underline{u}$ is non-zero vector then $\underline{u}\cdot\underline{v}=$:	0	1	-1	u^2
10	A vector perpendicular to both vectors $\underline{a}$ and $\underline{b}$ is:	$\underline{a}\cdot\underline{b}$	$\underline{a}\times\underline{b}$	$\frac{\underline{a}\cdot\underline{b}}{\lvert\underline{a}\rvert}$	$\underline{b}\cdot\underline{a}$
11	$\lim_{n\to\infty}\left(1-\frac{1}{n}\right)^n=$:	e^{-1}	e	e^2	$\frac{1}{e^2}$
12	Domain of $f(x)=2+\sqrt{x-1}$, $\forall x\in R$ is:	$(-1,\infty)$	$(1,\infty)$	$(2,\infty)$	$(-2,\infty)$
13	If $f(x)=\cos x$ then $f'(\sin^{-1}x)=$:	$-\sin x$	$-x$	1	x
14	If $y=e^{2x}$ then $y_4=$:	$16e^{2x}$	$8e^{2x}$	$4e^{2x}$	$-16e^{2x}$
15	$\frac{1}{x}\frac{d}{dx}(\sin x^2)=$:	$2x\cos x^2$	$2\cos x^2$	$2x\sin x^2$	$\sin x^2$
16	If $y=5e^{3x-4}$ then $\frac{dy}{dx}=$:	$5e^{3x}$	e^{3x-4}	$15e^{3x-4}$	$5(3x-4)$
17	$\int\frac{a}{x}dx=$:	$ax+c$	$a\ell n\lvert x\rvert+c$	$-\frac{a}{x^2}+c$	$\frac{1}{a}\ell nx+c$
18	$\int e^x(\sin x+\cos x)\,dx=$:	$e^x\cos x+c$	$e^x\sin x$	$e^x\sin x+c$	$e^x\cos x$
19	$\int\sin 5x\,dx=$:	$-\frac{1}{a}\cos x$	$-\frac{1}{5}\cos 5x+c$	$\frac{1}{5}\sin x+c$	$\frac{1}{5}\cos 5x+c$
20	Solution of different equation $\frac{dy}{dx}=-y$ is :	$y=ce^x$	$y=ce^{-x}$	e^x	$\frac{1}{c}e^{-x}$

FSD

Intermediate Part Second Roll No. _____

MATHEMATICS (Subjective) Group – I

Time: 02:30 Hours Marks: 80

SECTION – I

2. **Attempt any EIGHT parts:** 16

(i) Find the domain and range of $g(x) = \sqrt{x^2 - 4}$

(ii) Find $f^{-1}(x)$ if $f(x) = \frac{2x+1}{x-1}$

(iii) Find $\lim_{x \to a} \frac{x^n - a^n}{x^m - a^m}$

(iv) Find $\lim_{x \to 0} \frac{\frac{1}{e^x - 1}}{\frac{1}{e^x + 1}}$, $x > 0$

(v) If $y = x^4 + 2x^2 + 2$, prove that $\frac{dy}{dx} = 4x\sqrt{y-1}$

(vi) Differentiate sin x w.r.t. cot x

(vii) Find $\frac{dy}{dx}$ if $x^2 - 4xy - 5y = 0$

(viii) If $f(x) = \ell n \sqrt{e^{2x} + e^{-2x}}$, find $f'(x)$

(ix) If $y = \ell n(\tanh x)$, find $\frac{dy}{dx}$

(x) If $y = x^2 \ell n\left(\frac{1}{x}\right)$, find $\frac{dy}{dx}$

(xi) If $x = a(\cos t + \sin t)$, $y = a(\sin t - t\cos t)$, find $\frac{dy}{dx}$

(xii) Apply Maclaurin series prove that $e^{2x} = 1 + 2x + 4\frac{x^2}{2!} + \ldots$

3. **Attempt any EIGHT parts:** 16

(i) Use differential to approximate the value of $\sqrt{17}$

(ii) Evaluate $\int x\sqrt{x^2 - 1}\, dx$

(iii) Evaluate $\int \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right) dx$

(iv) Evaluate $\int \tan^2 x\, dx$

(v) Evaluate $\int \frac{\sec^2 x}{\sqrt{\tan x}} dx$

(vi) Evaluate $\int \ell nx\, dx$

(vii) Evaluate $\int_0^{\frac{\pi}{2}} x\cos x\, dx$

(viii) Solve the differential equation $y\,dx + x\,dy = 0$

(ix) Find the coordinates of the point that divides the join of A(–6, 3) and B(5, –2) in the ratio 2 : 3 internally.

(x) By means of slopes that the points (4, – 5) , (7 , 5) and (10 , 15) lie on the same line.

(xi) Find e with y-intercept: –7 and slope: –5.

y $2x^2 + 3xy - 5y^2 = 0$

(Continued P/2)

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4. **Attempt any NINE parts:** 18

(i) Graph the solution set of $3x - 2y \geq 6$

(ii) Find equation of circle with center at $(\sqrt{2}, -3\sqrt{3})$ and radius $2\sqrt{2}$

(iii) Find length of tangent from point P (–5, 10) to circle $5x^2 + 5y^2 + 14x + 12y - 10 = 0$

(iv) Find vertex and directrix of parabola $x^2 = -16y$

(v) Find equation of parabola with focus (– 3 , 1) and directrix x = 3

(vi) Find center and foci of $\frac{x^2}{4} - \frac{y^2}{9} = 1$

(vii) Find eccentricity and vertex of $\frac{y^2}{16} - \frac{x^2}{9} = 1$

(viii) Write the vector $\overrightarrow{PQ}$ in the form $x\underline{i} + y\underline{j}$, P(2 , 3) , Q(6 , –2)

(ix) Find a unit vector in the direction of $\underline{v} = 2\underline{i} - \underline{j}$

(x) Find a vector whose magnitude is 4 and is parallel to $2\underline{i} - 3\underline{j} + 6\underline{k}$

(xi) Find a real number α so that $\underline{u} = \alpha\underline{i} + 2\alpha\underline{j} - \underline{k}$, $\underline{v} = \underline{i} + \alpha\underline{j} + 3\underline{k}$ are perpendicular.

(xii) Compute $\underline{b} \times \underline{a}$ if $\underline{a} = 2\underline{i} + \underline{j} - \underline{k}$, $\underline{b} = \underline{i} - \underline{j} + \underline{k}$

(xiii) Prove that $\underline{u} \cdot (\underline{v} \times \underline{w}) + \underline{v} \cdot (\underline{w} \times \underline{u}) + \underline{w} \cdot (\underline{u} \times \underline{v}) = 3\underline{u} \cdot (\underline{v} \times \underline{w})$

SECTION – II Attempt any THREE questions. Each question carries 10 marks.

5. (a) Evaluate $\lim_{\theta \to 0} \frac{\tan\theta - \sin\theta}{\sin^3\theta}$ 05

(b) Show that $\frac{dy}{dx} = \frac{y}{x}$ if $\frac{y}{x} = \tan^{-1}\frac{x}{y}$ 05

6. (a) Solve $\int e^{-x} \sin 2x \, dx$ 05

(b) Find the angles of the triangle whose vertices are A(–5 , 4) , B(–2 , –1) and C(7 , –5) 05

7. (a) Evaluate $\int_0^{\frac{\pi}{4}} \cos^4 t \, dt$ 05

(b) Maximize f (x , y) = x + 3y subject to the constraints: $2x + 5y \leq 30$; $5x + 4y \leq 20$; $x \geq 0$, $y \geq 0$ 05

8. (a) Write an equation of circle passing through the points A(–7 , 7) , B(5 , –1) , C(10 , 0) 05

(b) Given force $\vec{F} = 2i + j - 3k$ acting at a point A(1, – 2, 1) find the moment of $\vec{F}$ about the point B(2 , 0 , – 2) 05

9. (a) Show that $y = \frac{\ell nx}{x}$ has maximum value at x = e 05

(b) Show that the ordinate at any point P of the parabola is a mean proportional between the length of the latus rectum and the abscissa of P. 05