

BOARD OF INTERMEDIATE AND SECONDARY EDUCATION, MULTAN
OBJECTIVE KEY FOR INTERMEDIATE ANNUAL EXAMINATION, 2021

179

Name of Subject: Mathematics

Session: 2021

Group: 1st

Group: 2nd Group

Q. Nos	Paper Code 4191	Paper Code 4193	Paper Code 4195	Paper Code 4197
1	A	C	A	B
2	D	A	D	C
3	B	B	B	B
4	C	C	A	A
5	B	A	D	D
6	B	D	A	B
7	C	B	A	A
8	B	C	D	D
9	A	B	C	A
10	D	B	A	A
11	B	C	B	D
12	A	B	C	C
13	D	A	A	A
14	A	D	D	B
15	A	B	B	C
16	D	A	C	A
17	C	D	B	D
18	A	A	B	B
19	B	A	C	C
20	C	D	B	B

Q. Nos	Paper Code 4192	Paper Code 4194	Paper Code 4196	Paper Code 4198
1	D	D	D	C
2	B	B	A	A
3	D	A	C	B
4	C	D	B	D
5	A	D	A	A
6	B	B	D	C
7	D	D	B	B
8	A	C	C	A
9	C	A	B	D
10	B	B	C	B
11	A	D	D	C
12	D	A	B	B
13	B	C	A	C
14	C	B	D	D
15	B	A	D	B
16	C	D	B	A
17	D	B	D	D
18	B	C	C	D
19	A	B	A	B
20	D	C	B	D

سرٹیفکیٹ بابت تصحیح سوالیہ پرچہ مارکنگ Key

ہم نے مضمون Mathematics پرچہ II گروپ I, II سکیم انٹرمیڈیٹ سالانہ امتحان 2021 کا

سوالیہ پرچہ انشائیہ و معروضی (Subjective & Objective) کو نظر عین چیک کر لیا ہے یہ پرچہ ALP Syllabus کے عین مطابق Set کیا گیا ہے۔ اس سوالیہ پرچہ میں کسی قسم کی کوئی غلطی نہ ہے۔ ہم نے سوالیہ پرچہ کا اردو اور انگریزی Version بھی چیک کر لیا ہے۔ یہ Version آپس میں مطابقت رکھتے ہیں۔ نیز اس پرچہ کی معروضی (MCQs) Key کی بابت تصدیق کی جاتی ہے کہ اس میں بھی کسی قسم کی کوئی غلطی نہ ہے۔ مزید یہ کہ ہم نے Key بنانے سے متعلق دفتر کی جانب سے تیار کردہ ہدایات وصول کر کے ان کا بغور مطالعہ کر لیا ہے اور ان کی روشنی میں Key بنائی ہے۔ نیز سب ایگزامینرز کیلئے تفصیلی مارکنگ ہدایات / مارکنگ سکیم / Rubrics بھی تیار کر دی گئی ہیں۔

Prepared & Checked By:

Dated:

S.#	Name	Designation	Institution	Mobile No	Signature
1	محاورہ / سوالیہ پرچہ	Ass. Prof.	E.U.M	03006364668	
2	M. Imran Shahid	A.P	Govt. College of Science	03008090903	
3	M. Ranizan Sheikh	Assoc. Prof.	Govt. A.H. S.S. Ass. College	03188338382	
4	Dr. Abdul Mueed	A.P	E.U.M Multan	0321-6319672	
5					

Re-Checked By ہم نے درج بالا سوالیہ پرچہ (انشائیہ + معروضی) معروضی "Key" اور ہدایات کے حوالہ سے مکمل طور پر تکرار کر لی ہے۔ کسی قسم کی کوئی غلطی نہ ہے۔

1	M. Yousaf Ch.	A.S.P	Govt. College of Science	03332000863	
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3					

INTERMEDIATE PART-II (12th CLASS)

MATHEMATICS PAPER-II

TIME ALLOWED: 2.30 Hours

GROUP-I

SUBJECTIVE

MAXIMUM MARKS: 80

NOTE: Write same question number and its part number on answer book, as given in the question paper.

SECTION-I

2. Attempt any eight parts.

8 × 2 = 16

- (i) Determine whether the function $f(x) = \sin x + \cos x$ is even or odd.
- (ii) With out finding the inverse, state domain and range of f^{-1} where $f(x) = \frac{x-1}{x-4}$ $x \neq 4$
- (iii) Evaluate the limit $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 + x - 6}$ by using algebraic techniques.
- (iv) Express the Limit $\lim_{x \rightarrow 0} (1 + 2x^2)^{\frac{1}{x^2}}$ in terms of e .
- (v) Find the derivative of $(x + 4)^{\frac{1}{3}}$ by definition.
- (vi) Differentiate $x^2 - \frac{1}{x^2}$ w.r.t x^4 .
- (vii) If $y = \ln(x + \sqrt{x^2 + 1})$ then find $\frac{dy}{dx}$
- (viii) If $y = x^2 \cdot e^{-x}$ then find y_2
- (ix) If $x = 1 - t^2$ and $y = 3t^2 - 2t^3$ then find $\frac{dx}{dt}$ and $\frac{dy}{dt}$
- (x) If $f(x) = 4 - x^2$, $x \in (-2, 2)$ then find interval in which $f(x)$ is increasing or decreasing.
- (xi) Prove that $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1 + x^2}$
- (xii) If $y = \sin 3x$ then find y_4

3. Attempt any eight parts.

8 × 2 = 16

- (i) Using differentials find $\frac{dy}{dx}$ and $\frac{dx}{dy}$ if $x^2 + 2y^2 = 16$
- (ii) Evaluate $\int \cos 3x \sin 2x \, dx$
- (iii) Evaluate $\int \frac{x^2}{4 + x^2} \, dx$
- (iv) Evaluate $\int x \ln x \, dx$
- (v) Evaluate $\int \frac{(a-b)x}{(x-a)(x-b)} \, dx$, $a > b$
- (vi) Evaluate $\int_0^3 \frac{dx}{x^2 + 9}$
- (vii) Solve the differential equation $y \, dx + x \, dy = 0$
- (viii) Evaluate $\int \sec x \, dx$
- (ix) Find K so that the line joining $A(7, 3)$, $B(K, -6)$ and the line joining $C(-4, 5)$, $D(-6, 4)$ are parallel.
- (x) Find whether the given point $P(5, 8)$ lies above or below the line $2x - 3y + 6 = 0$
- (xi) Determine value of P such that the lines $2x - 3y - 1 = 0$, $3x - y - 5 = 0$ and $3x + Py + 8 = 0$ meet at a point.
- (xii) Find the lines represented by $3x^2 + 7xy + 2y^2 = 0$

4. Attempt any nine parts.

- (i) Graph the solution set of linear inequality in xy -plane $3x - 2y \geq 6$
- (ii) Find the equation of a circle with ends of a diameter at $(-3, 2)$ and $(5, -6)$
- (iii) Find the centre and radius of a circle $4x^2 + 4y^2 - 8x + 12y - 25 = 0$
- (iv) Write down the equation of normal to the circle $x^2 + y^2 = 25$ at $(4, 3)$
- (v) Find the vertex and directrix of $x^2 = 4(y - 1)$
- (vi) Write the equation of parabola with focus $(-3, 1)$ and directrix $x - 2y - 3 = 0$
- (vii) Find the equation of hyperbola with Foci $(\pm 5, 0)$ and vertex is $(3, 0)$
- (viii) Find the magnitude of vector $\underline{u} = \underline{i} + \underline{j}$
- (ix) Find a unit vector in the direction of $\underline{v} = \underline{i} + 2\underline{j} - \underline{k}$
- (x) Find the direction cosines of $\underline{v} = 3\underline{i} - \underline{j} + 2\underline{k}$
- (xi) If $\underline{u} = [2, -3, 1]$, $\underline{v} = [2, 4, 1]$ find the cosine of angle θ between $\underline{u}$ and $\underline{v}$
- (xii) If $\underline{a} \times \underline{b} = 0$ and $\underline{a} \cdot \underline{b} = 0$, what conclusion can be drawn about $\underline{a}$ or $\underline{b}$?
- (xiii) Find α so that $\underline{i} - \underline{j} + \underline{k}$, $\underline{i} - 2\underline{j} - 3\underline{k}$ and $3\underline{i} - \alpha\underline{j} + 5\underline{k}$ are coplanar.

SECTION-II

NOTE: Attempt any three questions.

3 × 10 = 30

5.(a) If $f(x) = \begin{cases} \frac{\sqrt{2x+5} - \sqrt{x+7}}{x-2}, & x \neq 2 \\ K, & x = 2 \end{cases}$ Find the value of K so that f is continuous at $x = 2$

(b) If $x = a \cos^3 \theta$, $y = b \sin^3 \theta$, show that $a \frac{dy}{dx} + b \tan \theta = 0$

6.(a) Evaluate the integral $\int \frac{\sqrt{2}}{\sin x + \cos x} dx$

(b) Find the condition that the lines $y = m_1x + c_1$, $y = m_2x + c_2$, $y = m_3x + c_3$ are concurrent.

7. (a) Evaluate $\int_0^{\pi/4} \frac{\sin x - 1}{\cos^2 x} dx$

(b) Maximize $f(x, y) = 2x + 5y$ subject to constraints $2y - x \leq 8$, $x - y \leq 4$, $x \geq 0$, $y \geq 0$

8. (a) Write equations of two tangents from $(2, 3)$ to the circle $x^2 + y^2 = 9$

(b) By using vectors prove that $\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$

9.(a) If $y = (\cos^{-1} x)^2$, prove that $(1 - x^2)y_2 - xy_1 - 2 = 0$

(b) Show that an equation of parabola with focus at $(a \cos \alpha, a \sin \alpha)$ and directrix $x \cos \alpha + y \sin \alpha + a = 0$ is $(x \sin \alpha - y \cos \alpha)^2 = 4a(x \cos \alpha + y \sin \alpha)$

MATHEMATICS PAPER-II

TIME ALLOWED: 30 Minutes

GROUP-I

OBJECTIVE

MAXIMUM MARKS: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) If $f(x) = \sqrt{x+4}$ then $f(x^2+4)$ is equal to:
 (A) $\sqrt{x^2+8}$ (B) $\sqrt{x^2-8}$ (C) $\sqrt{x-8}$ (D) x^2-8
- (2) The function $f(x) = \frac{2+3x}{2x}$ is not continuous at: (A) $x = -3$ (B) $x = -\frac{2}{3}$ (C) $x = 1$ (D) $x = 0$
- (3) $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a} = \underline{\hspace{2cm}}$ (A) $f'(x)$ (B) $f'(a)$ (C) $f'(0)$ (D) $f'(x-a)$
- (4) $f(x) = x^{\frac{2}{3}}$, then $f'(8) = \underline{\hspace{2cm}}$ (A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{1}{3}$ (D) 3
- (5) The derivative of $\frac{x^3+2x^2}{x^3}$ equals: (A) $\frac{2}{x^2}$ (B) $\frac{-2}{x^2}$ (C) $\frac{1}{2x^2}$ (D) $\frac{-1}{2x^2}$
- (6) If $f(x) = \tan^{-1} x$, then $f'(\cot x)$ is equal to:
 (A) $\frac{1}{1+x^2}$ (B) $\sin^2 x$ (C) $\cos^2 x$ (D) $\sec^2 x$
- (7) $f(x+\delta x) = \underline{\hspace{2cm}}$
 (A) $f'(x)dx$ (B) $f(x) - f'(x)dx$ (C) $f(x) + f'(x)dx$ (D) $f(x)dx$
- (8) $\int \frac{a}{x\sqrt{x^2-1}} dx = \underline{\hspace{2cm}}$
 (A) $a \tan^{-1} x$ (B) $-a \operatorname{cosec}^{-1} x + c$ (C) $-a \sec^{-1} x + c$ (D) $\frac{1}{a} \sec^{-1} x + c$
- (9) When the expression $\sqrt{a^2 - x^2}$ involves in integration substitute, is:
 (A) $x = a \sin \theta$ (B) $a \sec \theta$ (C) $a \tan \theta$ (D) $a = \sin \theta$
- (10) $\int_0^3 \frac{1}{\sqrt{9-x^2}} dx = \underline{\hspace{2cm}}$ (A) $\frac{2}{\pi}$ (B) $\frac{-2}{\pi}$ (C) $\frac{-\pi}{2}$ (D) $\frac{\pi}{2}$
- (11) Which of the following is not a solution of the system of inequalities
 $x + 2y \leq 8$, $2x - 3y \leq 6$, $2x + y \geq 2$ $x \geq 0$, $y \geq 0$
 (A) (1, 0) (B) (8, 0) (C) (0, 4) (D) (3, 0)
- (12) When axes are translated, the coordinates of the point $(-6, 9)$ are changed into $(-3, 7)$, find the point through which axes are translated:
 (A) $(-3, 2)$ (B) $(3, -2)$ (C) $(7, -3)$ (D) $(-9, 6)$
- (13) The equation of horizontal line passing through $(-5, 3)$ is:
 (A) $x + 5 = 0$ (B) $-5x + 3y = 0$ (C) $3x - 5y = 0$ (D) $y - 3 = 0$
- (14) A line passes through $(1, 5)$ and $(k, 7)$ has a slope k , the values of k is:
 (A) -1 and 2 (B) 3 and -2 (C) $2, -3$ (D) $-1, -2$
- (15) The focus of the parabola $y^2 = 4ax$ is:
 (A) $(a, 0)$ (B) $(0, a)$ (C) $(-a, 0)$ (D) $(0, -a)$
- (16) The eccentricity of $\frac{y^2}{4} - x^2 = 1$ equals: (A) $\frac{-2}{\sqrt{5}}$ (B) $\frac{2}{\sqrt{5}}$ (C) $\frac{-\sqrt{5}}{2}$ (D) $\frac{\sqrt{5}}{2}$
- (17) Conic are the curves obtained by cutting a right circular cone by:
 (A) Sphere (B) A line (C) A plane (D) A curve
- (18) If $\underline{a}$ and $\underline{b}$ are two non-zero vectors, then $\underline{a} \times \underline{b} = \underline{\hspace{2cm}}$
 (A) $-\underline{b} \times \underline{a}$ (B) $\underline{a} \cdot \underline{b}$ (C) $-\underline{a} \times -\underline{b}$ (D) $\underline{b} \times \underline{a}$
- (19) Angle between the vectors $\underline{i} + \underline{j}$, $\underline{i} - \underline{j}$ is: (A) π (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{4}$ (D) 0
- (20) Projection of $\underline{a}$ along $\underline{b}$ is:
 (A) $\hat{a} \cdot \hat{b}$ (B) $\underline{a} - \underline{b}$ (C) $\underline{a} \cdot \hat{b}$ (D) $\hat{a} \cdot \underline{b}$

MATHEMATICS PAPER-II

TIME ALLOWED: 30 Minutes

GROUP-I

OBJECTIVE

MAXIMUM MARKS: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) Conic are the curves obtained by cutting a right circular cone by:
(A) Sphere (B) A line (C) A plane (D) A curve
- (2) If $\underline{a}$ and $\underline{b}$ are two non-zero vectors, then $\underline{a} \times \underline{b} =$ _____
(A) $-\underline{b} \times \underline{a}$ (B) $\underline{a} \cdot \underline{b}$ (C) $-\underline{a} \times -\underline{b}$ (D) $\underline{b} \times \underline{a}$
- (3) Angle between the vectors $\underline{i} + \underline{j}$, $\underline{i} - \underline{j}$ is: (A) π (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{4}$ (D) 0
- (4) Projection of $\underline{a}$ along $\underline{b}$ is:
(A) $\hat{a} \cdot \hat{b}$ (B) $\underline{a} - \underline{b}$ (C) $\underline{a} \cdot \hat{b}$ (D) $\hat{a} \cdot \underline{b}$
- (5) If $f(x) = \sqrt{x+4}$ then $f(x^2+4)$ is equal to:
(A) $\sqrt{x^2+8}$ (B) $\sqrt{x^2-8}$ (C) $\sqrt{x-8}$ (D) x^2-8
- (6) The function $f(x) = \frac{2+3x}{2x}$ is not continuous at: (A) $x = -3$ (B) $x = -\frac{2}{3}$ (C) $x = 1$ (D) $x = 0$
- (7) $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a} =$ _____ (A) $f'(x)$ (B) $f'(a)$ (C) $f'(0)$ (D) $f'(x-a)$
- (8) $f(x) = x^{\frac{2}{3}}$, then $f'(8) =$ _____ (A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{1}{3}$ (D) 3
- (9) The derivative of $\frac{x^3+2x^2}{x^3}$ equals: (A) $\frac{2}{x^2}$ (B) $\frac{-2}{x^2}$ (C) $\frac{1}{2x^2}$ (D) $\frac{-1}{2x^2}$
- (10) If $f(x) = \tan^{-1} x$, then $f'(\cot x)$ is equal to:
(A) $\frac{1}{1+x^2}$ (B) $\sin^2 x$ (C) $\cos^2 x$ (D) $\sec^2 x$
- (11) $f(x+\delta x) =$ _____
(A) $f'(x)dx$ (B) $f(x) - f'(x)dx$ (C) $f(x) + f'(x)dx$ (D) $f(x)dx$
- (12) $\int \frac{a}{x\sqrt{x^2-1}} dx =$ _____
(A) $a \tan^{-1} x$ (B) $-a \operatorname{cosec}^{-1} x + c$ (C) $-a \sec^{-1} x + c$ (D) $\frac{1}{a} \sec^{-1} x + c$
- (13) When the expression $\sqrt{a^2 - x^2}$ involves in integration substitute, is:
(A) $x = a \sin \theta$ (B) $a \sec \theta$ (C) $a \tan \theta$ (D) $a = \sin \theta$
- (14) $\int_0^3 \frac{1}{\sqrt{9-x^2}} dx =$ _____ (A) $\frac{2}{\pi}$ (B) $\frac{-2}{\pi}$ (C) $\frac{-\pi}{2}$ (D) $\frac{\pi}{2}$
- (15) Which of the following is not a solution of the system of inequalities
 $x + 2y \leq 8$, $2x - 3y \leq 6$, $2x + y \geq 2$ $x \geq 0$, $y \geq 0$
(A) (1, 0) (B) (8, 0) (C) (0, 4) (D) (3, 0)
- (16) When axes are translated, the coordinates of the point $(-6, 9)$ are changed into $(-3, 7)$, find the point through which axes are translated:
(A) $(-3, 2)$ (B) $(3, -2)$ (C) $(7, -3)$ (D) $(-9, 6)$
- (17) The equation of horizontal line passing through $(-5, 3)$ is:
(A) $x + 5 = 0$ (B) $-5x + 3y = 0$ (C) $3x - 5y = 0$ (D) $y - 3 = 0$
- (18) A line passes through $(1, 5)$ and $(k, 7)$ has a slope k , the values of k is:
(A) -1 and 2 (B) 3 and -2 (C) $2, -3$ (D) $-1, -2$
- (19) The focus of the parabola $y^2 = 4ax$ is:
(A) $(a, 0)$ (B) $(0, a)$ (C) $(-a, 0)$ (D) $(0, -a)$
- (20) The eccentricity of $\frac{y^2}{4} - x^2 = 1$ equals: (A) $\frac{-2}{\sqrt{5}}$ (B) $\frac{2}{\sqrt{5}}$ (C) $\frac{-\sqrt{5}}{2}$ (D) $\frac{\sqrt{5}}{2}$

MATHEMATICS PAPER-II

TIME ALLOWED: 30 Minutes

GROUP-I

OBJECTIVE

MAXIMUM MARKS: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) When the expression $\sqrt{a^2 - x^2}$ involves in integration substitute, is:
 - (A) $x = a \sin \theta$
 - (B) $a \sec \theta$
 - (C) $a \tan \theta$
 - (D) $a = \sin \theta$
- (2) $\int_0^3 \frac{1}{\sqrt{9 - x^2}} dx =$ _____
 - (A) $\frac{2}{\pi}$
 - (B) $\frac{-2}{\pi}$
 - (C) $\frac{-\pi}{2}$
 - (D) $\frac{\pi}{2}$
- (3) Which of the following is not a solution of the system of inequalities $x + 2y \leq 8$, $2x - 3y \leq 6$, $2x + y \geq 2$ $x \geq 0$, $y \geq 0$
 - (A) (1, 0)
 - (B) (8, 0)
 - (C) (0, 4)
 - (D) (3, 0)
- (4) When axes are translated, the coordinates of the point $(-6, 9)$ are changed into $(-3, 7)$, find the point through which axes are translated:
 - (A) $(-3, 2)$
 - (B) $(3, -2)$
 - (C) $(7, -3)$
 - (D) $(-9, 6)$
- (5) The equation of horizontal line passing through $(-5, 3)$ is:
 - (A) $x + 5 = 0$
 - (B) $-5x + 3y = 0$
 - (C) $3x - 5y = 0$
 - (D) $y - 3 = 0$
- (6) A line passes through $(1, 5)$ and $(k, 7)$ has a slope k , the values of k is:
 - (A) -1 and 2
 - (B) 3 and -2
 - (C) 2 , -3
 - (D) -1 , -2
- (7) The focus of the parabola $y^2 = 4ax$ is:
 - (A) $(a, 0)$
 - (B) $(0, a)$
 - (C) $(-a, 0)$
 - (D) $(0, -a)$
- (8) The eccentricity of $\frac{y^2}{4} - x^2 = 1$ equals:
 - (A) $\frac{-2}{\sqrt{5}}$
 - (B) $\frac{2}{\sqrt{5}}$
 - (C) $\frac{-\sqrt{5}}{2}$
 - (D) $\frac{\sqrt{5}}{2}$
- (9) Conic are the curves obtained by cutting a right circular cone by:
 - (A) Sphere
 - (B) A line
 - (C) A plane
 - (D) A curve
- (10) If $\underline{a}$ and $\underline{b}$ are two non-zero vectors, then $\underline{a} \times \underline{b} =$ _____
 - (A) $-\underline{b} \times \underline{a}$
 - (B) $\underline{a} \cdot \underline{b}$
 - (C) $-\underline{a} \times -\underline{b}$
 - (D) $\underline{b} \times \underline{a}$
- (11) Angle between the vectors $\underline{i} + \underline{j}$, $\underline{i} - \underline{j}$ is:
 - (A) π
 - (B) $\frac{\pi}{2}$
 - (C) $\frac{\pi}{4}$
 - (D) 0
- (12) Projection of $\underline{a}$ along $\underline{b}$ is:
 - (A) $\hat{a} \cdot \hat{b}$
 - (B) $\underline{a} - \underline{b}$
 - (C) $\underline{a} \cdot \hat{b}$
 - (D) $\hat{a} \cdot \underline{b}$
- (13) If $f(x) = \sqrt{x+4}$ then $f(x^2+4)$ is equal to:
 - (A) $\sqrt{x^2+8}$
 - (B) $\sqrt{x^2-8}$
 - (C) $\sqrt{x-8}$
 - (D) x^2-8
- (14) The function $f(x) = \frac{2+3x}{2x}$ is not continuous at:
 - (A) $x = -3$
 - (B) $x = -\frac{2}{3}$
 - (C) $x = 1$
 - (D) $x = 0$
- (15) $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a} =$ _____
 - (A) $f'(x)$
 - (B) $f'(a)$
 - (C) $f'(0)$
 - (D) $f'(x-a)$
- (16) $f(x) = x^{\frac{2}{3}}$, then $f'(8) =$ _____
 - (A) $\frac{1}{2}$
 - (B) $\frac{2}{3}$
 - (C) $\frac{1}{3}$
 - (D) 3
- (17) The derivative of $\frac{x^3 + 2x^2}{x^3}$ equals:
 - (A) $\frac{2}{x^2}$
 - (B) $\frac{-2}{x^2}$
 - (C) $\frac{1}{2x^2}$
 - (D) $\frac{-1}{2x^2}$
- (18) If $f(x) = \tan^{-1} x$, then $f'(\cot x)$ is equal to:
 - (A) $\frac{1}{1+x^2}$
 - (B) $\sin^2 x$
 - (C) $\cos^2 x$
 - (D) $\sec^2 x$
- (19) $f(x + \delta x) =$ _____
 - (A) $f'(x)dx$
 - (B) $f(x) - f'(x)dx$
 - (C) $f(x) + f'(x)dx$
 - (D) $f(x)dx$
- (20) $\int \frac{a}{x\sqrt{x^2-1}} dx =$ _____
 - (A) $a \tan^{-1} x$
 - (B) $-a \operatorname{cosec}^{-1} x + c$
 - (C) $-a \sec^{-1} x + c$
 - (D) $\frac{1}{a} \sec^{-1} x + c$

MATHEMATICS PAPER-II

TIME ALLOWED: 30 Minutes

GROUP-I

OBJECTIVE

MAXIMUM MARKS: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

(1) If $f(x) = \tan^{-1} x$, then $f'(\cot x)$ is equal to:

(A) $\frac{1}{1+x^2}$

(B) $\sin^2 x$

(C) $\cos^2 x$

(D) $\sec^2 x$

(2) $f(x + \delta x) =$ _____

(A) $f'(x) dx$

(B) $f(x) - f'(x) dx$

(C) $f(x) + f'(x) dx$

(D) $f(x) dx$

(3) $\int \frac{a}{x\sqrt{x^2-1}} dx =$ _____

(A) $a \tan^{-1} x$

(B) $-a \operatorname{cosec}^{-1} x + c$

(C) $-a \sec^{-1} x + c$

(D) $\frac{1}{a} \sec^{-1} x + c$

(4) When the expression $\sqrt{a^2 - x^2}$ involves in integration substitute, is:

(A) $x = a \sin \theta$

(B) $a \sec \theta$

(C) $a \tan \theta$

(D) $a = \sin \theta$

(5) $\int_0^3 \frac{1}{\sqrt{9-x^2}} dx =$ _____

(A) $\frac{2}{\pi}$

(B) $\frac{-2}{\pi}$

(C) $\frac{-\pi}{2}$

(D) $\frac{\pi}{2}$

(6) Which of the following is not a solution of the system of inequalities

$x + 2y \leq 8, 2x - 3y \leq 6, 2x + y \geq 2 \quad x \geq 0, y \geq 0$

(A) (1, 0)

(B) (8, 0)

(C) (0, 4)

(D) (3, 0)

(7) When axes are translated, the coordinates of the point $(-6, 9)$ are changed into $(-3, 7)$, find the point through which axes are translated:

(A) $(-3, 2)$

(B) $(3, -2)$

(C) $(7, -3)$

(D) $(-9, 6)$

(8) The equation of horizontal line passing through $(-5, 3)$ is:

(A) $x + 5 = 0$

(B) $-5x + 3y = 0$

(C) $3x - 5y = 0$

(D) $y - 3 = 0$

(9) A line passes through $(1, 5)$ and $(k, 7)$ has a slope k , the values of k is:

(A) -1 and 2

(B) 3 and -2

(C) $2, -3$

(D) $-1, -2$

(10) The focus of the parabola $y^2 = 4ax$ is:

(A) $(a, 0)$

(B) $(0, a)$

(C) $(-a, 0)$

(D) $(0, -a)$

(11) The eccentricity of $\frac{y^2}{4} - x^2 = 1$ equals:

(A) $\frac{-2}{\sqrt{5}}$

(B) $\frac{2}{\sqrt{5}}$

(C) $\frac{-\sqrt{5}}{2}$

(D) $\frac{\sqrt{5}}{2}$

(12) Conic are the curves obtained by cutting a right circular cone by:

(A) Sphere

(B) A line

(C) A plane

(D) A curve

(13) If $\underline{a}$ and $\underline{b}$ are two non-zero vectors, then $\underline{a} \times \underline{b} =$ _____

(A) $-\underline{b} \times \underline{a}$

(B) $\underline{a} \cdot \underline{b}$

(C) $-\underline{a} \times -\underline{b}$

(D) $\underline{b} \times \underline{a}$

(14) Angle between the vectors $\underline{i} + \underline{j}$, $\underline{i} - \underline{j}$ is:

(A) π

(B) $\frac{\pi}{2}$

(C) $\frac{\pi}{4}$

(D) 0

(15) Projection of $\underline{a}$ along $\underline{b}$ is:

(A) $\hat{a} \cdot \hat{b}$

(B) $\underline{a} - \underline{b}$

(C) $\underline{a} \cdot \hat{b}$

(D) $\hat{a} \cdot \underline{b}$

(16) If $f(x) = \sqrt{x+4}$ then $f(x^2+4)$ is equal to:

(A) $\sqrt{x^2+8}$

(B) $\sqrt{x^2-8}$

(C) $\sqrt{x-8}$

(D) x^2-8

(17) The function $f(x) = \frac{2+3x}{2x}$ is not continuous at: (A) $x = -3$ (B) $x = -\frac{2}{3}$ (C) $x = 1$ (D) $x = 0$

(18) $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a} =$ _____

(A) $f'(x)$

(B) $f'(a)$

(C) $f'(0)$

(D) $f'(x-a)$

(19) $f(x) = x^{\frac{2}{3}}$, then $f'(8) =$ _____

(A) $\frac{1}{2}$

(B) $\frac{2}{3}$

(C) $\frac{1}{3}$

(D) 3

(20) The derivative of $\frac{x^3+2x^2}{x^3}$ equals:

(A) $\frac{2}{x^2}$

(B) $\frac{-2}{x^2}$

(C) $\frac{1}{2x^2}$

(D) $\frac{-1}{2x^2}$

INTERMEDIATE PART-II (12th CLASS)

MATHEMATICS PAPER-II

TIME ALLOWED: 2.30 Hours

GROUP-II

SUBJECTIVE

MAXIMUM MARKS: 80

NOTE: Write same question number and its part number on answer book,
as given in the question paper.

SECTION-I

2. Attempt any eight parts.

 $8 \times 2 = 16$

- (i) Express perimeter P of a square as a function of its area A .
- (ii) If $f(x) = \sqrt{x+1}$, $g(x) = \frac{1}{x^2}$ find $f \circ g(x)$, $g \circ f(x)$
- (iii) Evaluate $\lim_{x \rightarrow -1} \frac{x^3 - x}{x + 1}$
- (iv) Evaluate $\lim_{x \rightarrow 0} \frac{1 - \cos x}{\sin^2 x}$
- (v) Differentiate $\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2$ w.r.t. x
- (vi) Find $\frac{dy}{dx}$ if $x = 1 - t^2$, $y = 3t^2 - 2t^3$
- (vii) Prove that $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$
- (viii) Find $\frac{dy}{dx}$ if $y = x \cos y$
- (ix) Find $\frac{dy}{dx}$ if $y = \frac{x}{\ln x}$
- (x) Find $f'(x)$ if $f(x) = e^{\sqrt{x}-1}$
- (xi) Find y_2 if $y = x^2 e^{-x}$
- (xii) Find Maclaurin series for $\sin x$.

3. Attempt any eight parts.

 $8 \times 2 = 16$

- (i) Use differentials to find dy and δy if $y = x^2 + 2x$, x changes from 2 to 1.8.
- (ii) Find $\int \frac{1 - \sqrt{x}}{\sqrt{x}} dx$
- (iii) Find $\int \frac{1 - x^2}{1 + x^2} dx$
- (iv) Find $\int \frac{\cot \sqrt{x}}{\sqrt{x}} dx$
- (v) Find $\int \frac{\sqrt{2}}{\sin x + \cos x} dx$
- (vi) Find $\int x \ln x dx$
- (vii) Solve the differential equation $(e^x + e^{-x}) \frac{dy}{dx} = e^x - e^{-x}$
- (viii) Find $\int_0^{\pi/3} \cos^2 \theta \sin \theta d\theta$
- (ix) By means of slope, show that $(-1, -3)$, $(1, 5)$, $(2, 9)$ lie on the same line.
- (x) Check whether the point $(-7, 6)$ lies above or below the line $4x + 3y - 9 = 0$
- (xi) Check whether the lines $12x + 35y - 7 = 0$ and $105x - 36y + 11 = 0$ are parallel or perpendicular.
- (xii) Express $15y - 8x + 3 = 0$ in normal form.

4. Attempt any nine parts.

- (i) Graph the solution set of $3x - 2y \geq 6$
- (ii) Find an equation of the circle with ends of a diameter at $(-3, 2)$ and $(5, -6)$
- (iii) Find the radius of the circle $5x^2 + 5y^2 + 14x + 12y - 10 = 0$
- (iv) Find the length of the tangent drawn from the point $(-5, 4)$ to the circle $5x^2 + 5y^2 - 10x + 15y - 131 = 0$
- (v) Find the focus and directrix of the parabola $x^2 = 4(y - 1)$
- (vi) Find the foci and eccentricity of $\frac{y^2}{16} - \frac{x^2}{9} = 1$
- (vii) Write down the equation of tangent to $3x^2 + 3y^2 + 5x - 13y + 2 = 0$ at $(1, \frac{10}{3})$
- (viii) Find the magnitude of the vector $\vec{u} = \hat{i} + \hat{j}$
- (ix) Find a unit vector in the direction of $\underline{v} = 2\underline{i} - \underline{j}$
- (x) Let $\underline{v} = 3\underline{i} - 2\underline{j} + 2\underline{k}$, $\underline{w} = 5\underline{i} - \underline{j} + 3\underline{k}$ find $\underline{v} - 3\underline{w}$
- (xi) Find α so that $|\alpha\underline{i} + (\alpha + 1)\underline{j} + 2\underline{k}| = 3$
- (xii) Find the direction cosines of $\underline{v} = 3\underline{i} - \underline{j} + 2\underline{k}$
- (xiii) Find a vector of lengths 5 in the direction opposite that of $\underline{v} = \underline{i} - 2\underline{j} + 3\underline{k}$

SECTION-II**NOTE: Attempt any three questions.****3 × 10 = 30**5.(a) Prove that $y \frac{dy}{dx} + x = 0$ if $x = \frac{1-t^2}{1+t^2}$, $y = \frac{2t}{1+t^2}$

(b) If $f(x) = \begin{cases} \frac{\sqrt{2x+5} - \sqrt{x+7}}{x-2}, & x \neq 2 \\ K, & x = 2 \end{cases}$ find value of K so that f is continuous at $x = 2$

6.(a) Determine value of p such that the lines $2x - 3y - 1 = 0$, $3x - y - 5 = 0$ and $3x + py + 8 = 0$ meet at a point.(b) Evaluate $\int x^3 e^{5x} dx$ 7. (a) Evaluate $\int_{-1}^2 (x + |x|) dx$ (b) Minimize $z = 2x + y$; subject to the constraints $x + y \geq 3$; $7x + 5y \leq 35$; $x \geq 0$, $y \geq 0$ 8. (a) Show that the circles $x^2 + y^2 + 2x - 2y - 7 = 0$ and $x^2 + y^2 - 6x + 4y + 9 = 0$ touch externally.(b) A force of magnitude 6 units acting parallel to $2\underline{i} - 2\underline{j} + \underline{k}$, displaces, the point of application from $(1, 2, 3)$ to $(5, 3, 7)$. Find work done.9.(a) A box with a square base and open top is to have a volume of 4 cubic dm . Find the dimensions of the box which will require the least material.(b) Find the centre, foci and vertices of the following $9x^2 - 12x - y^2 + 2 = 0$

MATHEMATICS PAPER-II

TIME ALLOWED: 30 Minutes

GROUP-II

OBJECTIVE

MAXIMUM MARKS: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) The perimeter P of a square as a function of its area A is:
 (A) $P = \sqrt{A}$ (B) $P = 2\sqrt{A}$ (C) $P = 3\sqrt{A}$ (D) $P = 4\sqrt{A}$
- (2) $\lim_{x \rightarrow 3} \frac{x-3}{\sqrt{x}-\sqrt{3}}$ (A) $\sqrt{3}$ (B) $2\sqrt{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\frac{1}{2\sqrt{3}}$
- (3) If $3x + 4y - 5 = 0$, then $\frac{dy}{dx} =$ (A) $\frac{4}{3}$ (B) $-\frac{4}{3}$ (C) $\frac{3}{4}$ (D) $-\frac{3}{4}$
- (4) $\frac{d}{dx}(\sqrt{\cot x}) =$ (A) $\frac{1}{2\sqrt{\cot x}}$ (B) $\frac{\operatorname{cosec}^2 x}{2\sqrt{\cot x}}$ (C) $\frac{-\operatorname{cosec}^2 x}{2\sqrt{\cot x}}$ (D) $\frac{2\operatorname{cosec}^2 x}{\sqrt{\cot x}}$
- (5) If $f(x) = \tan^{-1} x$, then $f'(\cot x) =$ (A) $\sin^2 x$ (B) $\cos^2 x$ (C) $\sec^2 x$ (D) $\frac{1}{1+x^2}$
- (6) $\frac{d}{dx}(-\cot x) =$ (A) $\sec^2 x$ (B) $\operatorname{cosec}^2 x$ (C) $-\operatorname{cosec}^2 x$ (D) $\tan^2 x$
- (7) $\int a^x dx =$ (A) $a^x + c$ (B) $a^x + \ln a + c$ (C) $a^x \cdot \ln a + c$ (D) $a^x \cdot \frac{1}{\ln a} + c$
- (8) The anti-derivative of $\frac{1}{(1+x^2)\tan^{-1} x}$ is:
 (A) $\ln(\tan^{-1} x) + c$ (B) $\ln(1+x^2) + c$ (C) $2(\tan^{-1} x)^2 + c$ (D) $\frac{1}{2}(\tan^{-1} x)^2 + c$
- (9) Suitable substitution for solving $\int \frac{1}{x\sqrt{x^2-a^2}} dx$ is:
 (A) $x = a \sin \theta$ (B) $x = a \tan \theta$ (C) $x = a \sec \theta$ (D) $x = a \cos \theta$
- (10) $\int_0^{\pi/4} \sec^2 x dx =$ (A) 0 (B) 1 (C) 2 (D) $\frac{1}{2}$
- (11) If $(3, 5)$ is the mid-point of $(5, a)$ and $(1, 7)$, then $a =$ (A) 3 (B) 5 (C) 7 (D) 9
- (12) The point $(3, -8)$ lies in the _____ quadrant. (A) 1st (B) 2nd (C) 3rd (D) 4th
- (13) The lines ℓ_1 and ℓ_2 with slopes m_1 and m_2 respectively, are parallel if:
 (A) $m_1 m_2 = 1$ (B) $m_1 = m_2$ (C) $m_1 m_2 = -1$ (D) $m_1 + m_2 = 0$
- (14) The point $(2, 1)$ is not in the solution of the inequality:
 (A) $2x + y > 3$ (B) $2x + y > 4$ (C) $2x + y < 3$ (D) $2x + y > 1$
- (15) Centre of the circle $x^2 + y^2 + 7x - 3y = 0$, is:
 (A) $(7, -3)$ (B) $(-7/2, 3/2)$ (C) $(-7, 3)$ (D) $(7/2, -3/2)$
- (16) The equation of directrix of the parabola $x^2 = 5y$ is:
 (A) $x + \frac{5}{4} = 0$ (B) $x - \frac{5}{4} = 0$ (C) $y + \frac{5}{4} = 0$ (D) $y - \frac{5}{4} = 0$
- (17) The length of latus-rectum of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is:
 (A) $\frac{a^2}{2b}$ (B) $\frac{b^2}{2a}$ (C) $\frac{b^2}{a}$ (D) $\frac{2b^2}{a}$
- (18) If $\underline{u} = 2\alpha \underline{i} + \underline{j} - \underline{k}$ and $\underline{v} = \underline{i} + \alpha \underline{j} + 4\underline{k}$, are perpendicular, then $\alpha =$
 (A) $-\frac{4}{3}$ (B) $\frac{4}{3}$ (C) $\frac{3}{4}$ (D) 4
- (19) The vectors $\underline{u}$, $\underline{v}$ and $\underline{w}$ are coplanar if:
 (A) $\underline{u} \cdot \underline{v} \times \underline{w} = 0$ (B) $\underline{u} \cdot \underline{v} \times \underline{w} = 1$ (C) $\underline{u} \cdot \underline{v} \times \underline{w} = 2$ (D) $\underline{u} \cdot \underline{v} \times \underline{w} = 3$
- (20) Work done by a constant force $\vec{F}$ during a displacement $\vec{d}$ is equal to:
 (A) $\vec{F} \times \vec{d}$ (B) $\vec{d} \times \vec{F}$ (C) $\vec{F} + \vec{d}$ (D) $\vec{F} \cdot \vec{d}$

MATHEMATICS PAPER-II

TIME ALLOWED: 30 Minutes

GROUP-II

OBJECTIVE

MAXIMUM MARKS: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) The length of latus-rectum of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is:
 (A) $\frac{a^2}{2b}$ (B) $\frac{b^2}{2a}$ (C) $\frac{b^2}{a}$ (D) $\frac{2b^2}{a}$
- (2) If $\underline{u} = 2\alpha\underline{i} + \underline{j} - \underline{k}$ and $\underline{v} = \underline{i} + \alpha\underline{j} + 4\underline{k}$, are perpendicular, then $\alpha =$
 (A) $-\frac{4}{3}$ (B) $\frac{4}{3}$ (C) $\frac{3}{4}$ (D) 4
- (3) The vectors $\underline{u}$, $\underline{v}$ and $\underline{w}$ are coplanar if:
 (A) $\underline{u} \cdot \underline{v} \times \underline{w} = 0$ (B) $\underline{u} \cdot \underline{v} \times \underline{w} = 1$ (C) $\underline{u} \cdot \underline{v} \times \underline{w} = 2$ (D) $\underline{u} \cdot \underline{v} \times \underline{w} = 3$
- (4) Work done by a constant force $\vec{F}$ during a displacement $\vec{d}$ is equal to:
 (A) $\vec{F} \times \vec{d}$ (B) $\vec{d} \times \vec{F}$ (C) $\vec{F} + \vec{d}$ (D) $\vec{F} \cdot \vec{d}$
- (5) The perimeter P of a square as a function of its area A is:
 (A) $P = \sqrt{A}$ (B) $P = 2\sqrt{A}$ (C) $P = 3\sqrt{A}$ (D) $P = 4\sqrt{A}$
- (6) $\lim_{x \rightarrow 3} \frac{x-3}{\sqrt{x}-\sqrt{3}}$ (A) $\sqrt{3}$ (B) $2\sqrt{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\frac{1}{2\sqrt{3}}$
- (7) If $3x + 4y - 5 = 0$, then $\frac{dy}{dx} =$ (A) $\frac{4}{3}$ (B) $-\frac{4}{3}$ (C) $\frac{3}{4}$ (D) $-\frac{3}{4}$
- (8) $\frac{d}{dx}(\sqrt{\cot x}) =$ (A) $\frac{1}{2\sqrt{\cot x}}$ (B) $\frac{\operatorname{cosec}^2 x}{2\sqrt{\cot x}}$ (C) $\frac{-\operatorname{cosec}^2 x}{2\sqrt{\cot x}}$ (D) $\frac{2\operatorname{cosec}^2 x}{\sqrt{\cot x}}$
- (9) If $f(x) = \tan^{-1} x$, then $f'(\cot x) =$ (A) $\sin^2 x$ (B) $\cos^2 x$ (C) $\sec^2 x$ (D) $\frac{1}{1+x^2}$
- (10) $\frac{d}{dx}(-\cot x) =$ (A) $\sec^2 x$ (B) $\operatorname{cosec}^2 x$ (C) $-\operatorname{cosec}^2 x$ (D) $\tan^2 x$
- (11) $\int a^x dx =$ (A) $a^x + c$ (B) $a^x + \ln a + c$ (C) $a^x \cdot \ln a + c$ (D) $a^x \cdot \frac{1}{\ln a} + c$
- (12) The anti-derivative of $\frac{1}{(1+x^2)\tan^{-1} x}$ is:
 (A) $\ln(\tan^{-1} x) + c$ (B) $\ln(1+x^2) + c$ (C) $2(\tan^{-1} x)^2 + c$ (D) $\frac{1}{2}(\tan^{-1} x)^2 + c$
- (13) Suitable substitution for solving $\int \frac{1}{x\sqrt{x^2-a^2}} dx$ is:
 (A) $x = a \sin \theta$ (B) $x = a \tan \theta$ (C) $x = a \sec \theta$ (D) $x = a \cos \theta$
- (14) $\int_0^{\pi/4} \sec^2 x dx =$ (A) 0 (B) 1 (C) 2 (D) $\frac{1}{2}$
- (15) If (3, 5) is the mid-point of (5, a) and (1, 7), then $a =$ (A) 3 (B) 5 (C) 7 (D) 9
- (16) The point (3, -8) lies in the _____ quadrant. (A) 1st (B) 2nd (C) 3rd (D) 4th
- (17) The lines ℓ_1 and ℓ_2 with slopes m_1 and m_2 respectively, are parallel if:
 (A) $m_1 m_2 = 1$ (B) $m_1 = m_2$ (C) $m_1 m_2 = -1$ (D) $m_1 + m_2 = 0$
- (18) The point (2, 1) is not in the solution of the inequality:
 (A) $2x + y > 3$ (B) $2x + y > 4$ (C) $2x + y < 3$ (D) $2x + y > 1$
- (19) Centre of the circle $x^2 + y^2 + 7x - 3y = 0$, is:
 (A) (7, -3) (B) $(-\frac{7}{2}, \frac{3}{2})$ (C) (-7, 3) (D) $(\frac{7}{2}, -\frac{3}{2})$
- (20) The equation of directrix of the parabola $x^2 = 5y$ is:
 (A) $x + \frac{5}{4} = 0$ (B) $x - \frac{5}{4} = 0$ (C) $y + \frac{5}{4} = 0$ (D) $y - \frac{5}{4} = 0$

MATHEMATICS PAPER-II
GROUP-II

TIME ALLOWED: 30 Minutes

OBJECTIVE

MAXIMUM MARKS: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) $\int a^x dx =$ (A) $a^x + c$ (B) $a^x + \ln a + c$ (C) $a^x \cdot \ln a + c$ (D) $a^x \cdot \frac{1}{\ln a} + c$
- (2) The anti-derivative of $\frac{1}{(1+x^2)\tan^{-1}x}$ is:
 (A) $\ln(\tan^{-1}x) + c$ (B) $\ln(1+x^2) + c$ (C) $2(\tan^{-1}x)^2 + c$ (D) $\frac{1}{2}(\tan^{-1}x)^2 + c$
- (3) Suitable substitution for solving $\int \frac{1}{x\sqrt{x^2-a^2}} dx$ is:
 (A) $x = a \sin \theta$ (B) $x = a \tan \theta$ (C) $x = a \sec \theta$ (D) $x = a \cos \theta$
- (4) $\int_0^{\pi/4} \sec^2 x dx =$ (A) 0 (B) 1 (C) 2 (D) $\frac{1}{2}$
- (5) If (3, 5) is the mid-point of (5, a) and (1, 7), then $a =$ (A) 3 (B) 5 (C) 7 (D) 9
- (6) The point (3, -8) lies in the _____ quadrant. (A) 1st (B) 2nd (C) 3rd (D) 4th
- (7) The lines ℓ_1 and ℓ_2 with slopes m_1 and m_2 respectively, are parallel if:
 (A) $m_1 m_2 = 1$ (B) $m_1 = m_2$ (C) $m_1 m_2 = -1$ (D) $m_1 + m_2 = 0$
- (8) The point (2, 1) is not in the solution of the inequality:
 (A) $2x + y > 3$ (B) $2x + y > 4$ (C) $2x + y < 3$ (D) $2x + y > 1$
- (9) Centre of the circle $x^2 + y^2 + 7x - 3y = 0$, is:
 (A) (7, -3) (B) $(-\frac{7}{2}, \frac{3}{2})$ (C) (-7, 3) (D) $(\frac{7}{2}, -\frac{3}{2})$
- (10) The equation of directrix of the parabola $x^2 = 5y$ is:
 (A) $x + \frac{5}{4} = 0$ (B) $x - \frac{5}{4} = 0$ (C) $y + \frac{5}{4} = 0$ (D) $y - \frac{5}{4} = 0$
- (11) The length of latus-rectum of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is:
 (A) $\frac{a^2}{2b}$ (B) $\frac{b^2}{2a}$ (C) $\frac{b^2}{a}$ (D) $\frac{2b^2}{a}$
- (12) If $\underline{u} = 2\alpha \underline{i} + \underline{j} - \underline{k}$ and $\underline{v} = \underline{i} + \alpha \underline{j} + 4\underline{k}$, are perpendicular, then $\alpha =$
 (A) $-\frac{4}{3}$ (B) $\frac{4}{3}$ (C) $\frac{3}{4}$ (D) 4
- (13) The vectors $\underline{u}$, $\underline{v}$ and $\underline{w}$ are coplanar if:
 (A) $\underline{u} \cdot \underline{v} \times \underline{w} = 0$ (B) $\underline{u} \cdot \underline{v} \times \underline{w} = 1$ (C) $\underline{u} \cdot \underline{v} \times \underline{w} = 2$ (D) $\underline{u} \cdot \underline{v} \times \underline{w} = 3$
- (14) Work done by a constant force $\vec{F}$ during a displacement $\vec{d}$ is equal to:
 (A) $\vec{F} \times \vec{d}$ (B) $\vec{d} \times \vec{F}$ (C) $\vec{F} + \vec{d}$ (D) $\vec{F} \cdot \vec{d}$
- (15) The perimeter P of a square as a function of its area A is:
 (A) $P = \sqrt{A}$ (B) $P = 2\sqrt{A}$ (C) $P = 3\sqrt{A}$ (D) $P = 4\sqrt{A}$
- (16) $\lim_{x \rightarrow 3} \frac{x-3}{\sqrt{x}-\sqrt{3}} =$ (A) $\sqrt{3}$ (B) $2\sqrt{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\frac{1}{2\sqrt{3}}$
- (17) If $3x + 4y - 5 = 0$, then $\frac{dy}{dx} =$ (A) $\frac{4}{3}$ (B) $-\frac{4}{3}$ (C) $\frac{3}{4}$ (D) $-\frac{3}{4}$
- (18) $\frac{d}{dx}(\sqrt{\cot x}) =$ (A) $\frac{1}{2\sqrt{\cot x}}$ (B) $\frac{\operatorname{cosec}^2 x}{2\sqrt{\cot x}}$ (C) $\frac{-\operatorname{cosec}^2 x}{2\sqrt{\cot x}}$ (D) $\frac{2\operatorname{cosec}^2 x}{\sqrt{\cot x}}$
- (19) If $f(x) = \tan^{-1}x$, then $f'(\cot x) =$ (A) $\sin^2 x$ (B) $\cos^2 x$ (C) $\sec^2 x$ (D) $\frac{1}{1+x^2}$
- (20) $\frac{d}{dx}(-\cot x) =$ (A) $\sec^2 x$ (B) $\operatorname{cosec}^2 x$ (C) $-\operatorname{cosec}^2 x$ (D) $\tan^2 x$

MATHEMATICS PAPER-II

TIME ALLOWED: 30 Minutes

GROUP-II

OBJECTIVE

MAXIMUM MARKS: 20

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

Q.No.1

- (1) $\frac{d}{dx}(\sqrt{\cot x}) =$ (A) $\frac{1}{2\sqrt{\cot x}}$ (B) $\frac{\operatorname{cosec}^2 x}{2\sqrt{\cot x}}$ (C) $\frac{-\operatorname{cosec}^2 x}{2\sqrt{\cot x}}$ (D) $\frac{2\operatorname{cosec}^2 x}{\sqrt{\cot x}}$
- (2) If $f(x) = \tan^{-1} x$, then $f'(\cot x) =$ (A) $\sin^2 x$ (B) $\cos^2 x$ (C) $\sec^2 x$ (D) $\frac{1}{1+x^2}$
- (3) $\frac{d}{dx}(-\cot x) =$ (A) $\sec^2 x$ (B) $\operatorname{cosec}^2 x$ (C) $-\operatorname{cosec}^2 x$ (D) $\tan^2 x$
- (4) $\int a^x dx =$ (A) $a^x + c$ (B) $a^x + \ln a + c$ (C) $a^x \cdot \ln a + c$ (D) $a^x \cdot \frac{1}{\ln a} + c$
- (5) The anti-derivative of $\frac{1}{(1+x^2)\tan^{-1} x}$ is:
 (A) $\ln(\tan^{-1} x) + c$ (B) $\ln(1+x^2) + c$ (C) $2(\tan^{-1} x)^2 + c$ (D) $\frac{1}{2}(\tan^{-1} x)^2 + c$
- (6) Suitable substitution for solving $\int \frac{1}{x\sqrt{x^2-a^2}} dx$ is:
 (A) $x = a \sin \theta$ (B) $x = a \tan \theta$ (C) $x = a \sec \theta$ (D) $x = a \cos \theta$
- (7) $\int_0^{\pi/4} \sec^2 x dx =$ (A) 0 (B) 1 (C) 2 (D) $\frac{1}{2}$
- (8) If (3, 5) is the mid-point of (5, a) and (1, 7), then $a =$ (A) 3 (B) 5 (C) 7 (D) 9
- (9) The point (3, -8) lies in the _____ quadrant. (A) 1st (B) 2nd (C) 3rd (D) 4th
- (10) The lines ℓ_1 and ℓ_2 with slopes m_1 and m_2 respectively, are parallel if:
 (A) $m_1 m_2 = 1$ (B) $m_1 = m_2$ (C) $m_1 m_2 = -1$ (D) $m_1 + m_2 = 0$
- (11) The point (2, 1) is not in the solution of the inequality:
 (A) $2x + y > 3$ (B) $2x + y > 4$ (C) $2x + y < 3$ (D) $2x + y > 1$
- (12) Centre of the circle $x^2 + y^2 + 7x - 3y = 0$, is:
 (A) (7, -3) (B) $(-\frac{7}{2}, \frac{3}{2})$ (C) (-7, 3) (D) $(\frac{7}{2}, -\frac{3}{2})$
- (13) The equation of directrix of the parabola $x^2 = 5y$ is:
 (A) $x + \frac{5}{4} = 0$ (B) $x - \frac{5}{4} = 0$ (C) $y + \frac{5}{4} = 0$ (D) $y - \frac{5}{4} = 0$
- (14) The length of latus-rectum of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, is:
 (A) $\frac{a^2}{2b}$ (B) $\frac{b^2}{2a}$ (C) $\frac{b^2}{a}$ (D) $\frac{2b^2}{a}$
- (15) If $\underline{u} = 2\alpha \underline{i} + \underline{j} - \underline{k}$ and $\underline{v} = \underline{i} + \alpha \underline{j} + 4\underline{k}$, are perpendicular, then $\alpha =$
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- (17) Work done by a constant force $\vec{F}$ during a displacement $\vec{d}$ is equal to:
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- (20) If $3x + 4y - 5 = 0$, then $\frac{dy}{dx} =$ (A) $\frac{4}{3}$ (B) $-\frac{4}{3}$ (C) $\frac{3}{4}$ (D) $-\frac{3}{4}$