



Roll No.

Answer Sheet No. _____

Sig. of Candidate. _____

Sig. of Invigilator. _____

MATHEMATICS HSSC-II

SECTION – A (Marks 20)

Time allowed: 25 Minutes

NOTE:- Section-A is compulsory and comprises pages 1-2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Insert the correct option i.e. A / B / C / D in the empty box provided opposite each part. Each part carries one mark.

(i) $\lim_{x \rightarrow 0} \left(1 + \frac{x}{2}\right)^{\frac{2}{3x}}$ is equal to:

A. e^6

B. e^3

C. $e^{\frac{1}{3}}$

D. $e^{\frac{1}{6}}$

(ii) $\sin h^2 x - \cos h^2 x =$ _____

A. $\cos h 2x$

B. $-\cos h 2x$

C. 1

D. -1

(iii) $f(x) = ax^2 + 2bx + c$ has minimum value if:

A. $a > 0$

B. $a < 0$

C. $a > \frac{1}{2}$

D. $a < \frac{1}{2}$

(iv) $\lim_{x \rightarrow \infty} \frac{2x^3 + 5x + 7}{3x^2 + x - 1} =$ _____

A. 0

B. ∞

C. $\frac{2}{3}$

D. None of these

(v) $\frac{d}{dx} \left[\sqrt{x} - \frac{1}{\sqrt{x}} \right]^2 =$ _____

A. $1 + \frac{1}{x^2}$

B. $1 - \frac{1}{x^2}$

C. $1 - \frac{1}{2x^2}$

D. $1 - \frac{1}{\sqrt{x}}$

(vi) $\int \ln x \, dx =$ _____

A. $\frac{1}{x}$

B. $\frac{(\ln x)^2}{2}$

C. $x \ln x - x$

D. $x \ln x + x$

(vii) $f(x) = \sin^{-1} x$, then $f'(0)$ is equal to:

A. 0

B. 1

C. -1

D. ∞

(viii) $\int_{-1}^2 |x| \, dx =$ _____

A. $\frac{1}{2}$

B. $\frac{3}{2}$

C. $\frac{5}{2}$

D. $\frac{7}{2}$

- (ix) $\int a^{x^2} dx =$ _____
- A. $a^{2x} \ln a^2$ B. $\frac{a^{2x}}{\ln a \cdot 2}$
 C. $x^2 a^{x^2-1}$ D. None of these
- (x) Point of intersection of angle bisectors of a triangle is:
 A. Centroid B. Incentre
 C. Orthocentre D. Circumcentre
- (xi) (0, 0) is one solution of an inequality:
 A. $x - 7y < 2$ B. $2x + 5y > 1$
 C. $5x + 3y > 0$ D. $x + 4y > 5$
- (xii) Distance of a point (5, 2) from Y-axis is:
 A. 5 B. $\sqrt{29}$ C. 2 D. None of these
- (xiii) Slope of a line $2x + 3y + 4 = 0$ is:
 A. 2 B. 3 C. $-\frac{2}{3}$ D. $-\frac{3}{2}$
- (xiv) Radius of a circle $x^2 + y^2 + 4x - 2y - 1 = 0$:
 A. $\sqrt{2}$ B. 2 C. $\sqrt{5}$ D. $\sqrt{6}$
- (xv) Equation of directrix of parabola $y^2 = -8x$:
 A. $x = 2$ B. $x = -2$ C. $y = 2$ D. $y = -2$
- (xvi) Vertices of an ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$ is:
 A. (0, ± 3) B. (0, ± 5) C. (± 3 , 0) D. (± 5 , 0)
- (xvii) Foci of hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$ are:
 A. (± 3 , 0) B. (± 4 , 3)
 C. (± 5 , 0) D. None of these
- (xviii) $j \times i \cdot 2j =$ _____
 A. 0 B. 2 C. -2 D. None of these
- (xix) $\vec{F} = 2i - 5j - 7k$ and $\vec{d} = i + j + k$, then torque is:
 A. $11i - 4j - 7k$ B. $11i - 5j + 6k$
 C. $-11i + 4j + 7k$ D. None of these
- (xx) $\frac{d}{dx} \left[\sec^{-1} \frac{x}{2} \right] =$ _____
- A. $\frac{1}{\frac{x}{2} \sqrt{\frac{x^2}{4} - 1}}$ B. $\frac{1}{x \sqrt{x^2 - 4}}$
 C. $\frac{1}{x \sqrt{4 - x^2}}$ D. $\frac{2}{x \sqrt{x^2 - 4}}$

For Examiner's use only:

Total Marks:

20

Marks Obtained:



MATHEMATICS HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B and C: 80

NOTE:- Sections 'B' and 'C' comprise pages 1-2 and questions therein are to be answered on the separately provided answer book. Answer any ten parts from Section 'B' and attempt any five questions from Section 'C'. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

SECTION – B (Marks 40)

Q. 2 Attempt any TEN parts. All parts carry equal marks. (10 x 4 = 40)

- (i) Evaluate $\lim_{\theta \rightarrow 0} \frac{\tan \theta - \sin \theta}{\sin^3 \theta}$
- (ii) Determine whether $f(x) = \frac{\tan x}{x} - \frac{\sin x}{x}$ is even or odd function.
- (iii) If $\tan y(1 + \tan x) = 1 - \tan x$, then prove that $\frac{dy}{dx} = -1$
- (iv) If $y = \ln(x + \sqrt{x^2 + 1})$, find $\frac{dy}{dx}$
- (v) Show that $y = x^x$ has a minimum value at $x = 1/e$
- (vi) Use differential to find approximate value of $\sec 32^\circ$
- (vii) Evaluate $\int x^5 \ln x \, dx$
- (viii) Find area region bounded by $y = \cos \frac{x}{2}$ from $-\pi$ to π .
- (ix) Find an equation of a parabola with focus $(-3, 1)$ and directrix $x = 3$
- (x) Find an equation of an ellipse with vertices $(0, \pm 5)$ and $\text{eccentricity} = \frac{3}{5}$
- (xi) Derive standard equation of hyperbola.
- (xii) Find value of h such that the points $A(h, 1)$, $B(2, 7)$ and $C(-6, -7)$ are vertices of a right triangle with right angle at the vertex A .

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- (xiii) Find an equation of the line through $(5, -8)$ and perpendicular to the join of $A = (-15, -8)$ and $B(10, 7)$.
- (xiv) Use vectors to prove that in triangle ABC ,
- $$c = a \cos B + b \cos A$$

SECTION – C (Marks 40)

**Note:- Attempt any FIVE questions. All questions carry equal marks.
(5 x 8 = 40)**

Q. 3 Prove that $\lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \log_e a$

Q. 4 If $y = (\cos^{-1} x)^2$, prove that $(1 - x^2)y_2 - xy_1 - 2 = 0$

Q. 5 Evaluate $\int \sqrt{9 + 25x^2} dx$

Q. 6 Find orthocentre of a triangle whose vertices are $A(-2, 3)$, $B(-4, 1)$ and $C(3, 5)$.

Q. 7 Minimize $z = 2x + y$, subject to the constraints:
 $x + y \geq 3$, $7x + 5y \leq 35$, $x \geq 0$; $y \geq 0$

Q. 8 Find an equation of a circle passing through $A(3, -1)$, $B(0, 1)$ and having centre at $4x - 3y = 3$

Q. 9 A force of magnitude 6 unites acting parallel to $2\hat{i} - 2\hat{j} + \hat{k}$ displaces the point of application from $(1, 2, 3)$ to $(5, 3, 7)$. Find the work done.

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