ME - 2006

Test Booklet No.

348210

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Test Booklet Code

This booklet contains 12 pages. DO NOT open this Test Booklet until you are asked to do so.

Important Instructions :-

- 1. The MATHEMATICS test is consist of 40 questions. Each question carries 1 mark. For each correct response the candidate will get 1 mark. For each incorrect response, ¼ mark will be deducted. The maximum marks are 40.
- 2. The Test is of 1 hour duration.
- Use Black Ball Point Pen only for writing particulars on OMR Answer Sheet marking
 responses.
- 4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
- 5. On completion of the test, the candidate must handover the Answer Sheet to the Invigilator in the Room / Hall. The candidates are allowed to take away this Test Booklet with them.
- 6. The CODE for this Booklet is **B**. Make sure that the CODE printed on the Answer Sheet is the same as that on this booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigiltor for replacement of both the Test Booklet and the Answer Sheet.
- 7. The candidate should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet.
- 8. Do not write your Seat No. anywhere else, except in the specified space in the Test Booklet / Answer Sheet.
- 9. Use of white fluid for correction is not permissible on the Answer Sheet.
- 10. Each candidate must show, on demand his / her Admission Card to the Invigilator.
- 11. No candidate, without special permission of the Superintendent or Invigilator, should leave his / her seat
- 12. Use of Manual Calculator is permissible.
- 13. The candidate should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and must sign the Attendance Sheet (Patrak-01). Cases where a candidate has **not** signed the Attendance Sheet (Patrak-01) be deemed not to have handed over the Answer Sheet and dealt with as a unfair means case.
- 14. The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules ans Regulations of the Board.
- 15. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
- 16. The candidates will write the Correct Test Booklet Code as given in the Test Booklet / Answer Sheet in the Attendance Sheet. (Patrak-01)

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Candidate's Name:	
Exam.Seat No. (in figures)	(in words)
Name of Exam. Centre:	Exam. Centre No:
Test Booklet Code :	Test Booklet No.:
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Candidate's Sign Block Supt. Sign

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1.	What is the equation of the auxillary cir	cle of $\frac{x^2}{16} - \frac{y^2}{9} = 1$?
	A) $x^2 + y^2 = 9$	B) $x^2 + y^2 = 25$
	C) $x^2 + y^2 = 7$	D) $x^2 + y^2 = 16$
2.	Find the equation of tangent to the hype	rbola $4x^2 - y^2 = 64$, which is parallel to the
	line $8x - 6y + 11 = 0$.	
	A) $2x + y = 1$	B) Tangent does not exists
	C) $3x + y = 1$	D) $x + 3y = 1$
3.	For non-zero vectors $\overline{x}, \overline{y} \in R^3$ if $\overline{x} \cdot \overline{y} =$	$\overline{x} \mid \cdot \mid \overline{y} \mid$, then what is $\overline{x} \times \overline{y} = ?$
	A) ō	B) Unit vector
	C) 0	$\mathbf{D}) \left \overline{\boldsymbol{x}} \right \left \overline{\boldsymbol{y}} \right $
4.	Obtain $\lim_{x \to 2} \frac{(\cos \alpha)^x + (\sin \alpha)^x - 1}{x - 2}$, wh	ere $\left(0 < \alpha < \frac{\pi}{2}\right)$
	A) $Sin^2 \alpha Log_e Sin \alpha - Cos^2 \alpha Log_e Cos \alpha$	B) $\cos^2 \alpha \log_e \sin \alpha - \sin^2 \alpha \log_e \cos \alpha$
	C) $\cos^2 \alpha \log_e \cos \alpha - \sin^2 \alpha \log_e \sin \alpha$	D) $\cos^2 \alpha \log_e \cos \alpha + \sin^2 \alpha \log_e \sin \alpha$
5.	For the unit vectors \overline{a} and \overline{b} , if $\overline{a} + \overline{b}$	$=\overline{0}$, then what is $\overline{a} \cdot \overline{b}$?
	A) -1	B) 2
	C) 0	D) 1

(Space for Rough Work)

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6.	What is the area of $\triangle ABC$ if $\overrightarrow{AB} = \overline{i} + 2$	$\vec{j} + 3\vec{k}$ and $\vec{AC} = -3\vec{i} + 2\vec{j} + \vec{k}$ in $\triangle ABC$?
	A) $3\sqrt{5}$	B) $\frac{3}{2}\sqrt{5}$
	C) 45	D) $5\sqrt{3}$
7.	What is the magnitude of the resultant f	orce of the forces $(1, 2, -1)$ and $(-3, 0, 2)$?
	A) 5	B) $\sqrt{5}$
	C) 9	D) 3
8.	If $f(x) = 2^{x} + 2^{x+1} + 2^{x+2} + \dots + 2^{x+9}$, t	hen find $f'(2)$
	$(A) 2^x \text{ Log } 2$	B) None of these
	C) 1023 Log _e 16	D) 1023 Log _e 2
9.	What is the direction of the line passing t	through the points $(2, 1, 3)$ and $(3, 2, -1)$?
	A) $(-1, -1, 4)$	B) $(1, 1, -2)$
	C) $(1, 1, 4)$	D) $(-1, -1, -4)$
10.	What is the equation of line passing	through $(1, 2, 3)$ and perpendicular to
	3x + 4y - 5z = 6?	
	A) $\frac{x-1}{3} = \frac{y-2}{4} = \frac{3-z}{5}$	B) $\frac{x-3}{1} = \frac{y-4}{2} = \frac{z+5}{3}$
	C) $\frac{1-x}{3} = \frac{y-2}{4} = \frac{z-3}{-5}$	D) $\frac{x-1}{3} = \frac{2-y}{4} = \frac{3-z}{5}$

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11.	What is the perpendicular distance betwe	en $2x + 2y - z + 1 = 0$ and $x + y - \frac{z}{2} + 2 = 0$?
	A) √5	B) $\sqrt{2}$
	C) 2	D) 1
12.	What is the radius of the sphere whose e	xtrimities of the diameter are $(1, -1, 1)$ and
	(-1,1,1)?	
	A) $2\sqrt{2}$	B) 1
	C) $\sqrt{2}$	D) 2
13.	Find $\int e^{3Log x} \left(x^4 + 1\right)^{-1} dx$	
	A) $-Log(x^4+1)+c$	B) None of these
	C) $Log(x^4+1)+c$	D) $\frac{1}{4} Log(x^4+1)+c$
14.	$\frac{Lim}{x \to 0^+} \frac{Sin\sqrt{x}}{\sqrt[4]{x}} = ?$	
	A) -1	B) Does not exists
	C) 0	D) 1
15.	$\lim_{x \to 0} \frac{f(\cos x)}{x^2} = ? \text{ Where } f(x) = \frac{1-x}{1+x}$	
	$\mathbf{A}) \frac{1}{4}$	B) $\frac{1}{5}$
	C) $\frac{1}{2}$	D) $\frac{1}{3}$

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16.	If $\left\{ \frac{x}{ 3x+2 } \le \frac{1}{5} ; x \in R - \left(\frac{-2}{3}\right) \right\}$, then	what is the complement set of this set?
	A) $(1, \frac{7}{3})$	B) $\left(\frac{-7}{3}, 1\right)$
	C) $R - (1, \frac{7}{3})$	D) $R - \left(\frac{-7}{3}, 1\right)$
17.	$\frac{d}{dx}\left[Sec^{-1}e^{2x}\right] = ?$	
	A) $\frac{2}{\sqrt{e^{4x}-1}}$	$B) \frac{2}{e^{2x}\sqrt{e^{4x}-1}}$
	C) $\frac{1}{\sqrt{1-e^{4x}}}$	D) $-\frac{1}{\sqrt{1-e^{4x}}}$
18.	$\frac{d}{dx}\left[Tan^{-1}\left(\frac{x+a}{1-ax}\right)\right] = ? (\text{ Where } x \in R^+$, $a \in R^+$, $ax < 1$)
	$A) \frac{1}{1+a^2 x^2}$	B) $-\frac{1}{1+a^2x^2}$
	$C) \frac{1}{1+x^2}$	D) $\frac{-1}{1+x^2}$
19.	$\frac{d}{dx}\left[e^{\sin^{-1}x + \cos^{-1}x}\right] = ? (\text{Where } x \le 1)$	
	A) $\frac{\pi}{2}$	B) $-\frac{\pi}{2}$
	C) $e^{\pi/2}$	D) 0
20.	If there remains an error of 4% in measurements in percentage in the radius of a circulation of the radius of the	uring the area of a circle, then what is the rcle?
	A) 6%	D) 0.07

 A) 6%
 B) 8%

 C) 2%
 D) 4%

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21. If (2,3) lies on $y^2 = ax^3 + b$, slope of tangent at (2,3) is 4, then what is the value of a? B) 7 A) -7 D) -2 C) 2 What is the rate of change of the volume of sphere w.r.t. its surface area when its 22. radius is 2 units? B) None of these A) 2 units D) 3 units C) 1 unit $\int e^{-2Log x} dx = ? \quad (\text{where } x \neq 0)$ 23. B) $-\frac{2}{r} + c$ A) $-\frac{1}{r}+c$ D) $\frac{x^3}{3} + c$ C) $\frac{1}{r} + c$ 24. $\int (Sin^{-1}x + Cos^{-1}x) dx = ?$ $\mathbf{B}) \quad -\frac{\pi x}{2} + c$ A) x+cD) $\frac{\pi x}{2} + c$ C) Not possible **25.** $\int \frac{3Tan\frac{x}{3} - Tan^3\frac{x}{3}}{1 - 3Tan^2\frac{x}{3}} dx = ?$ B) Sec² x + cA) -Log |Cos x| + c**D**) -Log |Sec x| + cC) Log |Tan x| + c

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26. $\int_{0}^{\pi/2} \frac{(Sin x)^{2006}}{(Sin x)^{2006} + (Cos x)^{2006}} dx = ?$ A) $\frac{\pi}{2}$ B) None of these C) $2006 \cdot (Sin x)^{2007}$ $(D) = \frac{\pi}{4}$ 27. If $\int_{\sqrt{2}}^{R} \frac{1}{x\sqrt{x^2-1}} dx = \frac{\pi}{12}$, then what is the value of k? A) 0 B) 1 C) _2 D) 2 If $\int_{0}^{a} f(x) dx = m$ and fx is an even and continuous function defined on $[-\alpha, \alpha]$, then 28. evaluate $\int_{-a}^{a} f(x) dx \quad (a \in R^+)$ A) 2m B) 0 C) m_{2} D) m Find the degree of $(y_2)^2 - \sqrt{y_1} = y^3$ 29. 11 A) 3 B) 4 C) $\frac{1}{2}$ D) 2 A particle is moving with a uniform acceleration. If it covers a distance of 7.25 and 9.25 meters in 5^{th} and 9^{th} seconds respectively, then what is its initial velocity ? 30. A) 5.5 m/sB) 7 m/sC) 10 m/sD) 5 m/s

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BOOKLET B

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For right angle triangle ABC, AB = AC. What is the circumcentre of $\triangle ABC$ having 31. the vertices are A(1,1), B(5,1), C(1,4)? B) (3,1) A) $(3, \frac{5}{2})$ D) (6, 5) C) $(1, \frac{5}{2})$ A(2,-3) and B(-5,1) are two vertices of the $\triangle ABC$. Its centroid is on x-axis and 32. vertices C is on y-axis, then find the co-ordinates of C. B) (0,2) A) (2, 0)D) (-2,0) C) (0, -2)If A (11, 7), B(-1, k) and C (5, -1) are the vertices of $\triangle ABC$ and $m \angle ACB = \frac{\pi}{2}$, then 33. what is k? B) None of these A) $\frac{4}{3}$ D) 5 C) -5 Obtain the angle between the lines $\{(x,0) \mid x \in R\}$ and $\{(0, y) \mid y \in R\}$ 34. B) 0 A) $-\frac{\pi}{2}$ D) $\frac{\pi}{2}$ C) π If kx + 2y - 1 = 0 and 6x - 4y + 2 = 0 are identical lines, then determine k. 35. B) $\frac{1}{6}$ A) 6 D) -3 C) 3

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30	5. Line $12x + 5y$.	+ $60 = 0$ intersects the axes in A and B remarks have
	equation of the	\Rightarrow circle whose diameter as $\frac{1}{4R}$?
	A) $x^2 + y^2 - 5x^2$	$x + 12y = 0 \qquad \qquad$
	C) $x^2 + y^2 - 5x^2$	$x^2 + y^2 + 5x + 12y = 0$
	2 0.	D) $x^2 + y^2 + 5x - 12y = 0$
37.	If $(1, 2)$ is the length of a circ	centre of a circle passing through the point $(4, 6)$, then what is the sumference of this circle ?
	$(1) = \frac{1}{20\pi}$	B) None of these
	ο) _. 5π	D) 10π
38.	What is the value a parabola $y^2 = A$ $t = 3$	the of t such that $P(t)$ and $Q(3)$ are the end points of a focal chord of $4ax$?
	C) $t = -\frac{1}{3}$	D) $t = -3$ D) $t = \frac{1}{3}$
39.	What is the area rectum of $x^2 = 12$	a of a triangle whose vertices are vertex and end points of latus-
	A) 36	B) Non- Cut
	C) 9	D) 10
£0 ,	Find the length o	f major axis and its eccentricity of $\frac{x^2}{2}$, y^2
	A) $\frac{2}{5}$ and $\frac{3}{5}$	$\frac{1}{16} + \frac{1}{25} = 1.$
	() $5/and \sqrt{27}$	B) None of these
	$\sqrt{2}$ and $\sqrt{3}$	D) 10 and $\frac{3}{5}$

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