SAMPLE QUESTION PAPER

INSTITUTE NAME & LOGO

MHT-CET – EXAM YEAR

Maths : Full Portion Paper

Question Booklet Version	Roll No.	Question Booklet Sr. No.
(Write this number on your Answer Sheet)	**Answer Sheet No.**	(Write this number on your Answer Sheet)

Duration: 90 Minutes Total Marks: 100

This is to certify that, the entries of MHT-CET Roll No. and Answer Sheet No. have been correctly written and verified.

Candidate's Signature **Invigilator's Signature**

Instructions To Candidate

1. This question booklet contains 50 Objective Type Ques. in the subject of Mathematics(50).
2. The question papers and OMR (Optical Mark Reader) Answer Sheets are issued separately at the start of the examination
3. Choice and sequence for attempting questions will be as per the convenience of the candidate
4. Candidate should carefully read the instructions printed on the Question Booklet and Answer Sheet and make the correct entries on the Answer Sheet. As Answer Sheets are designed to suit the OPTICAL MARK READER (OMR) SYSTEM, special care should be taken to mark the entries correctly. Special care should be taken to fill QUESTION BOOKLET VERSION, SERIAL No. and MHT-CET Roll No. accurately. The correctness of entries has to be cross-checked by the invigilators. The candidate must sign on the Answer Sheet and Question Booklet
5. Read each question carefully.
6. Determine the correct answer from out of the four available options given for each question.
7. Fill the appropriate circle completely like this ●, for answering a particular question. Mark with Black ink ball point pen only.
8. Each answer with correct response shall be awarded two (2) mark for Mathematics. **There is no Negative Marking. No mark shall be awarded for marking two or more answers of same question, scratching or overwriting.**
9. **Use of whitener or any other material to erase/hide the circle once filled is not permitted.**
10. Avoid overwriting and/or striking of answer once marked.
11. Rough work should be done only on the blank space provided on the Question Booklet. Rough work should not be done on the Answer Sheet.
12. The required mathematical tables (Log etc.) will be provided along with the question booklet.
13. Immediately after the prescribed examination time is over, the Question Booklet and Answer sheet is to be returned to the invigilator. Confirm that both the candidate and invigilator have signed on question booklet and Answer sheet.
14. No candidate is allowed to leave the examination hall till the Paper gets over.

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201) For $0 \le x \le \pi$, the area bounded by y = x and $y = x + \sin x$, is

A) 2π B) 4π
C) 2 D) 4

202) $\int \sin^5 x \cos^4 x \, dx =$

A) $\frac{1}{5}\cos^5 x + \frac{2}{7}\cos^7 x - \frac{1}{9}\cos^9 x + c$

B) $-\frac{1}{5}\cos^5 x + \frac{2}{7}\cos^7 x - \frac{1}{9}\cos^9 x + c$

C) $\frac{1}{5}\cos^5 x + \frac{2}{7}\cos^7 x + \frac{1}{9}\cos^9 x + c$

D) None of these

203) If $\bar{a} = 2\bar{p} + 3\bar{q} - \bar{r}, \bar{b} = \bar{p} - 2\bar{q} + 2\bar{r}$ and $\bar{c} = -2\bar{p} + \bar{q} - 2\bar{r}$ and $\bar{R} = 3\bar{p} - \bar{q} + 2\bar{r}$, where $\bar{p}, \bar{q}, \bar{r}$ are non-coplanar vectors, then R in terms of $\bar{a}, \bar{b}, \bar{c}$ is

A) $5\bar{a} + 2\bar{b} + 3\bar{c}$ B) $2\bar{a} + 5\bar{b} + 3\bar{c}$
C) $3\bar{a} + 5\bar{b} + 2\bar{c}$ D) $5\bar{a} + 3\bar{b} + 2\bar{c}$

204) The shortest distance between lines $\bar{r} = (\lambda - 1)\hat{i} + (\lambda + 1)\hat{j} - (1 + \lambda)\hat{k}$ and $\bar{r} = (1 - \mu)\hat{i} + (2\mu - 1)\hat{j} + (\mu + 2)\hat{k}$ is

A) $\frac{\sqrt{5}}{2}$ B) 15
C) $\frac{5}{\sqrt{2}}$ D) $5\sqrt{2}$

205) If $a\hat{i} + \hat{j} + \hat{k}, \hat{i} - b\hat{j} + \hat{k}, \hat{i} + \hat{j} - c\hat{k}$ are coplanar, then abc + 2 is equal to

A) a - b - c B) a + b - c
C) a + b + c D) a - b + c

206) If $2\tan^2\theta = \sec^2\theta$, then the general value of θ is

A) $n\pi - \frac{\pi}{4}$ B) $n\pi + \frac{\pi}{4}$
C) $n\pi \pm \frac{\pi}{4}$ D) $2n\pi \pm \frac{\pi}{4}$

207) The point at which the maximum value of $(x + y)$, subject to the constraints $x + 2y \le 70, 2x + y \le 95$, $x, y \ge 0$ is obtained, is

A) (40, 15) B) (35, 20)
C) (30, 25) D) (20, 35)

208) If x + y = 16 and x^2+y^2 is minimum, then the values of x and y are

A) 8, 8 B) 6, 10
C) 4, 12 D) 3, 13

209) The vector and Cartesian equation of the line which passes through the point (1, 2, 3) and is parallel to the vector $\hat{i} - 2\hat{j} + 3\hat{k}$ are

A) $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(\hat{i} + 2\hat{j} + 3\hat{k})$;
$\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$

B) $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(\hat{i} - 2\hat{j} + 3\hat{k})$;
$\frac{x-1}{1} = \frac{y-2}{-2} = \frac{z-3}{3}$

C) $\vec{r} = (\hat{i} - 2\hat{j} + 3\hat{k}) + \lambda(\hat{i} + 2\hat{j} + 3\hat{k})$;
$\frac{x-1}{1} = \frac{y+2}{2} = \frac{z-3}{3}$

D) $\vec{r} = (\hat{i} - 2\hat{j} + 3\hat{k}) + \lambda(\hat{i} + 2\hat{j} + 3\hat{k})$;
$\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$

210) The tangent to the curve $x^2 + y^2 - 2x - 3 = 0$ is parallel to X-axis at the point

A) (±1, 2) B) (1, ± 2)
C) $(2, \pm\sqrt{3})$ D) (± 3, 0)

211) An experiment succeeds twice as often as it fails. Find the probability that in 4 trials there will be at least three success.

A) $\frac{24}{27}$ B) $\frac{16}{27}$
C) $\frac{8}{27}$ D) $\frac{4}{27}$

212) Following is the probability distribution

X :	0	1	2	3	4
P(X) :	0.1	0.2	0.3	0.15	0.25

Then the cumulative distribution function is

A)

X :	0	1	2	3	4
P(X) :	0.1	0.15	0.2	0.25	0.3

B)

X :	0	1	2	3	4
P(X) :	0.1	0.2	0.3	0.15	0.25

C)

X :	0	1	2	3	4
P(X) :	0.1	0.3	0.75	0.9	0.95

D)

X :	0	1	2	3	4
P(X) :	0.1	0.3	0.6	0.75	1

213) $\int \frac{xdx}{x^4+x^2+1} =$

A) $\left(\frac{x^2+1}{3}\right)\log|x^4+x^2+1|+c$

B) $\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{x^4+x^2+1}{\sqrt{2}}\right)+c$

C) $\tan^{-1}(x)\log\left|\frac{x^4+1}{x^2}\right|+c$

D) $\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2x^2+1}{\sqrt{3}}\right)+c$

214) If probability that a fluorescent light has a useful life of at least 800 hours is 0.9, then the probability that amongst 20 such lights at least 2 will not have a useful life of at least 800 hours is

A) $1-(2.9)(0.9)^{19}$

B) $1-(0.9)(2.9)^{20}$

C) $1-(2.9)(0.9)^{20}$

D) $1-(0.9)(2.9)^{19}$

215) If the angle between the vectors $\bar{a}$ and $\bar{b}$ having direction ratios 1,2,1 and 1,3k,1 is $\frac{\pi}{4}$, then k=

A) $\frac{2\pm3\sqrt{2}}{3}$ B) $\frac{-4\pm3\sqrt{2}}{3}$

C) $\frac{-2\pm3\sqrt{2}}{3}$ D) $\frac{4\pm3\sqrt{2}}{3}$

216) $\bar{a},\bar{b}$ and $\bar{c}$ are position vectors of points A, B and C respectively. If $2\bar{a}+3\bar{b}-5\bar{c}=0$, then the ratio in which C divides segment AB is

A) 2 : 3 B) 3 : 5

C) 3 : 2 D) 5 : 2

217) If $y=x^2+\cfrac{1}{x^2+\cfrac{1}{x^2+\cfrac{1}{x^2+.....\infty}}}$, then $\frac{dy}{dx}=$

A) $\frac{xy}{y-x^2}$ B) $\frac{xy}{y+x^2}$

C) $\frac{2xy}{2y-x^2}$ D) $\frac{2xy}{2+\frac{x^2}{y}}$

218) The differential equation obtained on eliminating A and B from the equation $y=A\cos\omega t+B\sin\omega t$ is

A) $y''-\omega y=0$

B) y'' + y = 0

C) y'' - y = 0

D) $y''=-\omega^2 y$

219) If matrix $A=\begin{bmatrix}1&0&-1\\3&4&5\\0&6&7\end{bmatrix}$ and its inverse is denoted by $A^{-1}=\begin{bmatrix}a_{11}&a_{12}&a_{13}\\a_{21}&a_{22}&a_{23}\\a_{31}&a_{32}&a_{33}\end{bmatrix}$, then the value of a_{23} =

A) $\frac{2}{5}$ B) $-\frac{2}{5}$

C) $\frac{1}{5}$ D) $\frac{21}{20}$

220) $\int 9^{\log_3(\sec x)}dx =$

A) sec x . tan x + c

B) cot x + c

C) tan x + c

D) $\sec^2x+\tan^2x+c$

221) The value of $\int_0^{\pi}|\sin^3\theta|\,d\theta$ is

A) 0 B) π

C) 3/8 D) 4/3

222) If the sum of the slopes of the lines represented by the equation $x^2-2xy\tan A-y^2=0$ be 4, then $\angle A$ =

A) $\tan^{-1}(-2)$ B) 60°

C) 45° D) 0°

223) In a ΔABC, if $3a=b+c$, then the value of $\cot\frac{B}{2}\cot\frac{C}{2}$ is

A) $\sqrt{2}$ B) $\sqrt{3}$

C) 1 D) 2

224) The value of f(0), so that the function $f(x)=\frac{(27-2x)^{1/3}-3}{9-3(243+5x)^{1/5}}, (x\neq 0)$ is continuous, is given by

A) 2

B) 6

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

D) 4

225) Let f be a function defined for every x, such that f''(x) = -f(x), f(0)=0, f'(0) =1, then f(x) is equal to

A) e^x -1 B) sinx

C) 2 sinx D) tanx

226) The value of the integral $\int_{-\pi/4}^{\pi/4}\log(\sec\theta-\tan\theta)d\theta$ is

A) 0 B) π

C) $\frac{\pi}{4}$ D) $\frac{\pi}{2}$

227) Area bounded by parabola $y^2 = x$ and straight line $2y = x$ is

A) 1 B) $\frac{1}{3}$

C) $\frac{2}{3}$ D) $\frac{4}{3}$

228) The degree of the differential equation $3\frac{d^2y}{dx^2} = \left\{1 + \left(\frac{dy}{dx}\right)^2\right\}^{3/2}$ is

A) 6 B) 3

C) 2 D) 1

229) If the sides of triangle are 6, 10 and 14, then the triangle is

A) equilateral

B) right angled

C) acute angled

D) obtuse angled

230) If $y = (x\cot^3 x)^{\frac{3}{2}}$, then $\frac{dy}{dx} =$

A) $\frac{3}{2}(x\cot^3 x)^{3/2}[\cot^3 x - 3x\,\text{cosec}^2 x]$

B) $\frac{3}{2}(x\cot^3 x)^{1/3}[\cot^3 x - 3x\text{cosec}^2 x]$

C) $\frac{3}{2}(x\cot^3 x)^{1/2}[\cot^2 x - 3x\cot^2 x\,\text{cosec}^2 x]$

D) $\frac{3}{2}(x\cot^3 x)^{1/2}[\cot^3 x - 3x\cot^2 x\,\text{cosec}^2 x]$

231) The value of $\int_0^1 \frac{dx}{x + \sqrt{1 - x^2}}$ is

A) $\frac{1}{2}$ B) $\frac{\pi}{4}$

C) $\frac{\pi}{3}$ D) $\frac{\pi}{2}$

232) The principal value of $\sin^{-1}\left[\sin\left(\frac{2\pi}{3}\right)\right]$ is

A) $-\frac{2\pi}{3}$ B) $\frac{\pi}{3}$

C) $\frac{4\pi}{3}$ D) $\frac{2\pi}{3}$

233) If $A = \begin{bmatrix} x & -2 \\ 3 & 7 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} \frac{7}{34} & \frac{1}{17} \\ \frac{-3}{34} & \frac{2}{17} \end{bmatrix}$, then the value of x is

A) 2

B) 3

C) 4

D) -4

234) The p.m.f. of a r.v. X is $P(x) = \begin{cases} kx, & x = 1, 2, 3 \\ 0, & \text{otherwise} \end{cases}$, then $E(x) =$

A) $\frac{49}{9}$ B) $\frac{14}{3}$

C) $\frac{7}{6}$ D) $\frac{7}{3}$

235) If $f(x) = \begin{cases} 4 - 3x & ; \quad 0 < x \le 2 \\ 2x - 6 & ; \quad 2 < x \le 3 \\ x + 5 & ; \quad 3 < x \le 6 \end{cases}$, then f(x) is

A) discontinuous at x = 2 and x = 3

B) continuous at x = 3 and discontinuous at x = 2

C) continuous at x = 2 and x = 3

D) continuous at x = 2 and discontinuous at x = 3

236) The set of all points where the function $f(x) = \frac{x}{1 + |x|}$ is differentiable are

A) $(0, \infty)$ B) $(-\infty, -1) \cup (1, \infty)$

C) $(-\infty, \infty)$ D) $(-\infty, 0) \cup (0, \infty)$

237) Lines $\frac{x}{1} = \frac{y-2}{2} = \frac{z+3}{3}$ and $\frac{x-2}{2} = \frac{y-6}{3} = \frac{z-3}{4}$ are

A) parallel B) perpendicular

C) coplanar D) non-coplanar

238) The symbolic form of the statement 'It is not true that intelligent persons are neither polite nor helpful' is

A) $\sim(\sim p \wedge \sim q)$ B) $\sim(p \vee q)$

C) $\sim(\sim p \vee \sim q)$ D) $\sim(p \wedge q)$

239) If the equation $ax^2 + by^2 + cx + cy = 0$ represents a pair of straight lines, then

A) c(a + b) = 0 B) b(c + a) = 0

C) a(b + c) = 0 D) a + b + c = 0

240) $\frac{d}{dx}[\sin\{2\cos^{-1}(\sin x)\}] =$

A) -2 sin 2x B) 2 sin 2x

C) -2 cos 2x D) 2 cos 2x

241) $\int \frac{1}{x^2 - x^3} dx =$

A) $\log\left(\frac{1-x}{x}\right) - \frac{1}{x} + c$ B) $\log\left(\frac{x}{1-x}\right) - \frac{1}{x} + c$

C) $\log\left(\frac{x}{1-x}\right) + \frac{1}{x} + c$ D) $\log\left(\frac{1-x}{x}\right) + \frac{1}{x} + c$

242) The solution of the differential equation $x^2dy = -2xy\,dx$ is

A) xy = c

B) $x^2y = c$

C) $xy^2 = c$

D) $x^2y^2 = c$

243) If A is a singular matrix, then adj A is
A) symmetric matrix
B) non-singular matrix
C) singular matrix
D) not defined

244) If a line passing through (4,1,2) and (5,k,0) is perpendicular to the line passing through (2,1,1) and (3,3,-1), then k=

A) $\frac{-1}{2}$ B) $\frac{3}{2}$

C) $\frac{-3}{2}$ D) $\frac{1}{2}$

245) The function $\sin x - bx + c$ will be increasing in the interval $(-\infty, \infty)$, if

A) $b \geq 0$ B) $b \leq 0$
C) $b < -1$ D) $b \leq 1$

246) The equations of the lines represented by the equation $ax^2 + (a+b)xy + by^2 + x + y = 0$ are
A) ax + by + 1= 0, x + y = 0
B) ax + by - 1= 0, x + y = 0
C) ax + by + 1= 0, x - y = 0
D) ay + bx + 1= 0, x + y = 0

247) Equation of a line passing through point (1,2,3) and perpendicular to the plane x + 2y - 5z + 9 = 0 are

A) $\frac{x-1}{1} = \frac{y-2}{-2} = \frac{z-3}{5}$

B) $\frac{x-1}{1} = \frac{y+2}{2} = \frac{z+3}{-5}$

C) $\frac{x+1}{1} = \frac{y+2}{2} = \frac{z+3}{3}$

D) $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{-5}$

248) $\int x \sin x \sec^3 x \, dx =$

A) $\frac{1}{2}(\sec^2 x - \tan x) + c$

B) $\frac{1}{2}(\sec^2 x + \tan x) + c$

C) $\frac{1}{2}(x\sec^2 x + \tan x) + c$

D) $\frac{1}{2}(x\sec^2 x - \tan x) + c$

249) The proposition $(p \wedge q) \rightarrow (p \vee q)$ is a
A) contradiction
B) tautology and contradiction
C) tautology
D) neither tautology nor contradiction

250) The lines $5x + 4y \geq 20$, $x \leq 6$, $y \leq 4$ form
A) a triangle B) a square
C) a rhombus D) a quadrilateral