Deeper Web Paper - 2012

Part III :- Subject : Mathematics

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

Answer Sheet No.

Day and Date :
Tuesday, 08 May 2012

Duration : 3.00 pm to 04.30 pm
Total Marks : 100

This is to certify that, the entries of MHT-CET-12 No. and Answer Sheet No. have been correctly written and Verified

Candidate's Signature *Invigilator's / Parents Signature*

Instructions to Candidates

1. This question booklet contains 100 Objective Type Questions in the subjects of Mathematics (50).
2. The question paper and OMR (Optical Mark Recognition) Answer Sheet is issued seperately 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 RECOGNITION (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 2012 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) Marks**. There is **No Negative Marking.** No mark shall be awarded for marking two or more answers of same question, scraching 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 answers once marked.
11. Rough work should not be done on the Answer Sheet.
12. 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.
13. No candidate is allowed to leave the examination hall till the paper gets over.

Q. 1 The standard form of LPP max. $z = 2x_1 + 5x_2$ subject to $2x_1 + 3x_2 \le 15,\ x_1 + x_2 \le 25$ and $x_1 \ge 0,\ x_2 \ge 0$ by simplex method is

A) Min. $z = 2x_1 + 5x_2$ s.t. $2x_1 + 3x_2 \ge 15,\ x_1 + x_2 \ge 25$

B) Max. $z = 2x_1 + 5x_2 + 0x_3 + 0x_4$ s.t. $x_1, x_2, x_3, x_4 \ge 0$

C) Max. $z = 2x_1 + 5x_2$ s.t. $2x_1 + 3x_2 = 15,\ x_2 + x_2 = 25,\ x_1, x_2 \ge 0$

D) Max. $z = 2x_1 + 5x_2 + 0x_3 + 0.x_4$ subject $2x_1 + 3x_2 + x_3 = 15,\ x_1 + x_2 + x_4 = 25$ and $x_1, x_2, x_3, x_4 \ge 0$

Q. 2 The solution of LPP Max Z = $45x_1 + 55x_2$

subject to $6x_1 + 4x_2 \le 120$

$3x_1 + 10x_2 \le 180$

$x_1 \ge 0,\ x_2 \ge 0$ is

A) Max. z = 1100, $x_1 = 10, x_2 = 10$

B) Max. z = 1225; $x_1 = 15, x_2 = 10$

C) Max. z = 1275, $x_1 = 10, x_2 = 15$

D) Max. z = 1500 ; $x_1 = 15, x_2 = 15$

Q. 3 Simplified form of the statement $p \vee \{[\sim p \wedge (p \vee q)] \vee (q \wedge p)\}$ is

A) $p \to q$

B) $p \wedge q$

C) $p \vee q$

D) $p \wedge \sim q$

Q. 4 If p, q, r are the simple proposition such that $(p \to q) \wedge \sim r$ is true then

A) p, q, r are all false

B) p and q are true, r is false

C) p and r are true and q is false

D) p, q, r are all true

Q. 5 Inverse of the statement, 'If you are good in logic then you are good in mathematics' is

A) If you are good in logic then you are not good in mathematics

B) If you are good in matheamatics then you are good is logic

C) If you are not good in logic then you are good in mathematics

D) If you are not good in logic then you are not good in mathematics

Space for rough work

Q. 6 If $\bar{u}$ is equally inclined with co-ordinate axes, $|\bar{u}| = 3$ then $\bar{u}$ is

A) $\pm\left(\hat{i}+\hat{j}+\hat{k}\right)$ B) $\pm\sqrt{3}\left(\hat{i}+\hat{j}+\hat{k}\right)$

C) $\pm 3\left(\hat{i}+\hat{j}+\hat{k}\right)$ D) $\pm\frac{1}{\sqrt{3}}\left(\hat{i}+\hat{j}+\hat{k}\right)$

Q. 7 Acute angle between the planes $\bar{r}.\left(2\hat{i}+\hat{j}+\hat{k}\right)=5$ and $\bar{r}.\left(\hat{i}-\hat{j}+2\hat{k}\right)=8$ is

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

C) $\frac{\pi}{4}$ D) $\frac{\pi}{6}$

Q. 8 If $\vec{c}=3\vec{a}-2\vec{b}$ and $c^2=9a^2-6ab+4b^2$ then angle between $\vec{a}$ and $\vec{b}$ is

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

C) $\frac{\pi}{4}$ D) $\frac{\pi}{6}$

Q. 9 If A(p, –3, 4) ,B(p, q, 2), C(2, 4, –5) are the vertices of ΔABC and G(3, 2, r) is it's centroid then the values of p, q, r are

A) $\frac{7}{2}, 5, \frac{1}{3}$ B) 1, 1, 1

C) 2, 2, 2 D) $\frac{5}{3}, 7, \frac{3}{2}$

Q. 10 If A (–1, 0, 5) and B(2, –1, 4) then the vector parallel to $\overline{AB}$ is

A) $3\hat{i}-\hat{j}+\hat{k}$ B) $3\hat{i}+\hat{j}+\hat{k}$

C) $6\hat{i}-2\hat{j}-2\hat{k}$ D) $-3\hat{i}+\hat{j}+\hat{k}$

Space for rough work

Q. 11 The scalar triple product is zero if

A) at least one of the vector is unit vector

B) at least one of the vector is zero vector

C) all the vectors are distinct and non co-planar

D) any two vectors are not scalar multiple of each other

Q. 12 $\vec{a},\vec{b},\vec{c}$ are three vectors, *x, y, z* are scalars not all zero such that $x\vec{a}+y\vec{b}+z\vec{c}=\vec{0}$ then $\vec{a}$, $\vec{b}$, $\vec{c}$ are

A) non coplanar

B) non zero non collinear and coplanar

C) non zero, non collinear, non coplanar

D) collinear and coplanar

Q. 13 If the points A(4, 5, 2), B(3, 2, 4) and C(5, 8, 0) are collinear then C divides the segment AB in the ratio

A) 1 : 2 internally

B) 1 : 2 externally

C) 2 : 1 internally

D) 2 : 1 externally

Q. 14 If $A=\begin{bmatrix}1 & 2\\ -1 & 3\end{bmatrix}$ then A(*adj* A) is

A) –5I

B) 5I

C) I

D) 0

Q. 15 The cofactors of the elements of 3rd column (in order) of given matrix $\begin{bmatrix}1 & -1 & 2\\ 3 & 0 & -2\\ 1 & 0 & 3\end{bmatrix}$ are

A) $\begin{bmatrix}0\\3\\2\end{bmatrix}$

B) $\begin{bmatrix}3\\1\\-1\end{bmatrix}$

C) $\begin{bmatrix}0\\-1\\3\end{bmatrix}$

D) $\begin{bmatrix}2\\8\\3\end{bmatrix}$

Space for rough work

Q. 16 A problem in statistics is given to three students A, B and C. Their chances of solving the the problem are $\frac{1}{3}, \frac{1}{4}$ and $\frac{1}{5}$ respectively. If all of them try independently. The probability of problem solved is

A) $\frac{2}{5}$ B) $\frac{3}{5}$

C) $\frac{1}{5}$ D) $\frac{4}{5}$

Q. 17 A random variable X has the following probability distribution

X = x	0	1	2	3	4
$P(X = x)$	$2c$	$4c$	$5c$	$3c$	c

then $P[X \leq 2]$ is

A) 1 B) $\frac{14}{15}$

C) $\frac{11}{15}$ D) $\frac{7}{15}$

Q. 18 The joint equation of lines passing through the origin; having sum of slopes $\frac{-5}{2}$ and product of slopes $\frac{-3}{2}$ is,

A) $2x^2 - 5xy - 3y^2 = 0$ B) $3x^2 - 5xy - 2y^2 = 0$

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

Q. 19 If the equation $kxy + 10x + 6y + 4 = 0$ represents a pair of lines then value of k is

A) 0 or 10 B) 0 or 12

C) 0 or 14 D) 0 or 15

Space for rough work

Q. 20 If $y = mx + c$ is a tangent to the circle $x^2 + y^2 = a^2$ then the point of contact of the tangent is

A) $\left(\frac{a^2m}{c}, \frac{a^2}{c}\right)$ B) $\left(\frac{-a^2m}{c}, \frac{a^2}{c}\right)$

C) $\left(\frac{-a^2m}{c}, \frac{-a^2}{c}\right)$ D) $\left(\frac{a^2m}{c}, \frac{-a^2}{c}\right)$

Q. 21 The length of the tangent segment to the circle $x^2 + y^2 - 10x + 10y + 1 = 0$ from the point (2, 2) is

A) 4 unit B) 3 unit

C) 7 unit D) 17 unit

Q. 22 The equationof the tangent to the parabola $y^2 = 8x$ at the point whose parameter is –2 is

A) $2x + 2y + 8 = 0$ B) $x + 2y + 8 = 0$

C) $x - 2y + 8 = 0$ D) $2x - 2y + 8 = 0$

Q. 23 The length of latus rectum of the ellipse $x^2 + 4y^2 = 9$ is

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

C) 12 D) 9

Q. 24 If e_1 and e_2 are the eccentricities of a hyperbola and its conjugate hyperbola respectively then $e_1^2 + e_2^2 =$

A) $e_1^2 \cdot e_2^2$ B) e_1^2

C) e_2^2 D) 1

Space for rough work

Q. 25 The cartesion co-ordinates of the point P($\frac{\pi}{3}$) on the ellipse $\frac{x^2}{36}+\frac{y^2}{16}=1$ are

A) $\left(3, 3\sqrt{3}\right)$ B) $\left(3\sqrt{3}, 2\right)$

C) $\left(3, 2\sqrt{3}\right)$ D) $\left(2\sqrt{3}, 3\right)$

Q. 26 If $f(2)=10, f(3)=13, f(4)=18, f(5)=25$ then the value of $\Delta^3 f(2)$ is

A) 0 B) 1

C) –1 D) 2

Q. 27 The approximate value of $\int_0^{\frac{\pi}{4}} \tan x\, dx$ with following table is

x	0	$\frac{\pi}{8}$	$\frac{\pi}{4}$
$\tan x$	0	0.4141	1

A) 0.3388 B) 0.3488

C) 0.3588 D) 0.3688

Q. 28 The value of $\Delta^2\left(x^3\right)$ taking h = 1 is

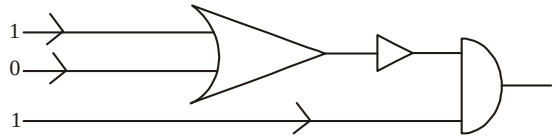
A) $6x$ B) $6x+3$

C) $6x+6$ D) $6x-2$

Q. 29 The complement of the Boolean expression $x.y+z'$ is

A) $x'.y'+z$ B) $(x'.y')+z$

C) $(x'+y')\cdot z$ D) $x.y+z'$

Q. 30 The output for 

A) 1 B) 0

C) 1,1 D) 0, 1

Space for rough work

Q. 31 Particular solution of the differential equation $e^x \frac{dy}{dx} = xe^y$, for $y(0) = 0$ is

A) $e^{x-y} = x+1$ B) $e^{x+y} = x+1$

C) $e^{-x+y} = x+1$ D) $e^{-x-y} = x-1$

Q. 32 Order and degree of D.E. $x^3 \frac{d^2y}{dx^2} + x\left(\frac{dy}{dx}\right)^4 + (x^2 - c^2)y = 0$ respectively are

A) 1 and 4 B) 2 and 1

C) 2 and 4 D) 4 and 2

Q. 33 The differential equation of all family of lines passing through origin is

A) $y_1 = xy$ B) $y = xy_1$

C) $yy_1 = x$ D) $y^2 = xy_1$

Q. 34 $\int \frac{(x+1)e^x}{\cos^2(x.e^x)} dx =$

A) $\tan\left(x.e^x\right) + c$ B) $-\tan\left(x.e^x\right) + c$

C) $\cot\left(x.e^x\right) + c$ D) $-\cot\left(x.e^x\right) + c$

Q. 35 The value of $\int e^x \left(\frac{2+\sin 2x}{1+\cos 2x}\right) dx$ is

A) $e^x \left(\frac{\tan x}{1+\tan x}\right) + c$ B) $e^x \cot x + c$

C) $e^x \tan x + c$ D) $e^x \left(\frac{2}{\tan x}\right) + c$

Space for rough work

Q. 36 The value of $\int \frac{x^2}{\sqrt{1-x^6}}dx$ is

A) $\frac{1}{3}\sin^{-1}\frac{1}{x^3}+c$ B) $\sin^{-1}\frac{x^3}{3}+c$

C) $\frac{1}{3}\sin^{-1}x^3+c$ D) $\sin\frac{1}{x^3}+c$

Q. 37 The value of $\int \frac{dx}{16+9\cos^2 x}dx$

A) $\frac{5}{4}\tan^{-1}\left(\frac{4}{5}\tan^{-1}x\right)+c$ B) $\frac{1}{20}\tan^{-1}\left(\frac{4}{5}\tan x\right)+c$

C) $\frac{1}{20}\tan\left(\frac{4}{5}\tan^{-1}x\right)+c$ D) $\frac{1}{20}\cos^{-1}\left(\frac{4}{5}\tan x\right)+c$

Q. 38 $\int_0^a \frac{dx}{x+\sqrt{a^2-x^2}}$ =

A) $\frac{\pi}{6}$ B) $\frac{\pi}{3}$

C) $\frac{\pi}{4}$ D) π

Q. 39 $\int_0^{\pi} \frac{1}{1+\sin x}dx = ...$

A) 2 B) 3

C) 0 D) –3

Q. 40 Volume of solid generated by revolving $\frac{x^2}{4}-\frac{y^2}{9}=1$, $x=2$, $x=4$ about x-axis is

A) 20π cu. units B) 40π cu. units

C) 60π cu. units D) 24π cu. units

Space for rough work

Q. 41 Derivative of x^x with respect to x is

A) $x^x \log x$ B) x^x

C) $x^x \log ex$ D) $x - x^{x-1}$

Q. 42 Rate of change of $a\sin^3\theta$ with respect to $a\cos^3\theta$ at $\theta = \frac{\pi}{3}$ is

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

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

Q. 43 If $x = at^2$ and $y = 2at$ then $\frac{d^2y}{dx^2}$

A) $\frac{1}{t}$ B) $-\frac{1}{t^2}$

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

Q. 44 If $y = \cot^{-1}\left(\frac{x-\sin x}{1+x\sin x}\right)$ then $\frac{dy}{dx} =$

A) $\frac{1}{1+x^2} + \frac{\cos x}{1+\sin^2 x}$ B) $\frac{-1}{1+x^2} + \frac{\cos x}{1+\sin^2 x}$

C) $\frac{1}{1+\frac{1}{x^2}} - \frac{\cos x}{1+\sin^2 x}$ D) $\frac{x^2}{1+x^2} + \frac{\sin x}{1+\cos^2 x}$

Q. 45 Differentation of $f(\tan x)$ w.r.t. $g(\sec x)$ at $x = \frac{\pi}{4}$ given that $f'(1) = 2$ and $g'\left(\sqrt{2}\right) = 4$ is

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

C) $\frac{1}{2}$ D) $\frac{1}{\sqrt{2}}$

Space for rough work

Q. 46 The displacement s of a particle at time t is given by $s = 2t^3 - 5t^2 + 4t - 3$ then the time when acceleation is 14 is

A) $t = 3$ B) $t = 2$

C) $t = 4$ D) $t = 1$

Q. 47 If $f(x) = x \log x$ then minimum value of $f(x)$ is

A) $-\frac{1}{e}$ B) $\log 2$

C) $\frac{1}{e}$ D) $\log e$

Q. 48 $\lim_{x \to 0} \frac{45^x - 9^x - 5^x + 1}{x \tan x} =$

A) $\log\left(\frac{5}{9}\right)$ B) $\log\left(\frac{9}{5}\right)$

C) $(\log 9)(\log 5)$ D) $\log 45$

Q. 49 If $f(x)$ is continuous at $x = 0$, where

$f(x) = \log(1+2x)^{\frac{1}{x}} + p$; $x > 0$

$= \frac{\sin qx}{x}$; $x < 0$

$= 6$; $x = 0$, the values of p and q respectively

A) $p = 6,\ q = 4$ B) $p = 4,\ q = 6$

C) $p = -6,\ q = 4$ D) $p = -4,\ q = -6$

Q. 50 Value of $\lim_{x \to 0} \frac{\sin mx^0}{2nx}$ is

A) $\frac{\pi m}{180n}$ B) $\frac{\pi m}{360n}$

C) $\frac{\pi m}{90n}$ D) $\frac{\pi n}{360m}$

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Space for rough work