Question Booklet Series: **A** *Question Booklet Serial No.:* **110632**

CET (UG) – 2023

Important: *Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.*

Roll No. ***(In Figure)*** ***(In Words)***

O.M.R. Answer Sheet Serial No.

Signature of Candidate: _____ *Signature of Invigilator:* _____

SUBJECT: MATHEMATICS

Time: 70 Minutes **Number of Questions: 60** **Total Marks: 120**

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.

INSTRUCTIONS:

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball /Black Gel Pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. The medium of examination shall be **English** only.
5. Please check that this Question Booklet contains **60** Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
6. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball /Black Gel Pen.**
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
9. **Negative marking will be adopted for evaluation i.e. 25% of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.**
10. The University will provide logarithmic table. Borrowing of log tables and any other material is not allowed.
11. For rough work only the blank sheet at the end of the Question Booklet be used.
12. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
15. **20 minutes** extra will be given to the visually handicapped/Person with Disability (PwD) for each paper.
16. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
17. Tele-communication equipment such as Cellular/cordless phones, pager, wireless, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. **Use of calculator is not allowed**.
18. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

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(MAT-A)

1. If $[2 \quad x \quad 3]\begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}\begin{bmatrix} x \\ 3 \end{bmatrix} = 0$, then find the value of x?

   (A) (0, -3/2) (B) (1/2, 2/3) (C) (-1/2, 2/3) (D) (0,0)

2. Find the area of triangle with vertices are (2, 7), (1, 1), (10, 8), if these points are not collinear.

   (A) 30 square units (B) 47/2 square units
   (C) 13 square units (D) 10 square units

3. If A and B are two invertible matrices of the same order then,

   (A) $(AB)^{-1} = B^{-1}A^{-1}$ (B) $(AB)^{-1} = A^{-1}\ B^{-1}$
   (C) $(A')^{-1} = (A^{-1})'$ (D) $(ABC)^{-1} = C^{-1}\ B^{-1}\ A^{-1}$

4. Let A = {1, 2, 3}, B = {3, 4} and C= {4, 5, 6} the value of (A×B) ∩ (A×C) is,

   (A) {(1,4), (2,4), (3,4)} (B) {(1,3), (3,2), (4,2)}
   (C) {(2,5), (6,2), (2,3)} (D) {(1,8), (9,2), (4,2)}

5. Simplest form of $\cot^{-1}\left(\frac{1}{\sqrt{x^2-1}}\right), |x| > 1$ is,

   (A) $\sin^{-1} x$ (B) $\cos^{-1} x$ (C) $\sec^{-1} x$ (D) $\cot^{-1} x$

6. If $A=\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then value of A^2-5A+ 7 I is,

   (A) 1 (B) 3 (C) 2 (D) 0

7. Find $\frac{dy}{dx}$ if y= $(\log x)^{cosx}$

   (A) $(sinx)^{cosx}$ (B) tan x
   (C) cos x + log x (D) $(logx)^{cosx}\left[\frac{cosx}{xlogx} - sinx \log(logx)\right]$

8. If y= $3e^{2x} + 2\ e^{3x}$ then value of d^2y/dx^2- 5 dy/dx +6y is,

   (A) 1 (B) 3/2 (C) 0 (D) 4

9. Find the points at which the tangent to the curve y=$\sqrt{4x-3y-1}$ has its slope 2/3,

   (A) (1, 2) (B) (3, 2) (C) (0, 2) (D) (0, 0)

10. If the radius of a sphere is measured as 9 cm with an error of 0.03 cm then, find the approximate error is calculating its volume,

    (A) 4.23 π cm^3 (B) 2.00 π cm^3 (C) 9.72 π cm^3 (D) 1.73 π cm^3

11. The line y = mx +1 is a tangent to the curve y^2 = 4x if the value of m is,

    (A) 1 (B) 2 (C) 3 (D) 1/2

12. The normal to the curve x^2 = 4y passing (1,2) is

    (A) $x + y = 3$ (B) $x - y = 3$ (C) $x + y = 1$ (D) $x - y = 1$

13. A cylindrical tank of radium 10m is being filed with wheat at the rate of 314 cubic meters per hour. Then the depth of the wheat is increasing at the rate of,

    (A) 1 m^3/n (B) 0.1 m^3/n (C) 1.2 m^3/n (D) 0.5 m^3/n

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14. Find the value of $\int \frac{1-\sin x}{\cos^2 x}\,dx$

(A) cosx + sin x + c
(B) cos x – sin x + c
(C) tan x – sec x + c
(D) cot x – tan x + c

15. If $f(x) = \int_0^x t \sin t\, dt$ then f'(x) is,

(A) cos x + sin x
(B) x sin x
(C) x cos x
(D) sin x + cos x

16. Find $\int_{-1}^{1} sin^5\, x\, cos^4\, x\, dx$

(A) 1
(B) 3
(C) 0
(D) 2

17. $\int \frac{dx}{e^x + e^{-x}}$ is equal to,

(A) $tan^{-1}(e^x) + c$
(B) $tan^{-1}(e^{-x}) + c$
(C) $\log(e^x - e^{-x}) + c$
(D) $\log(e^x + e^{-x}) + c$

18. The value of $\int_0^1 tan^{-1}(\frac{2x-1}{1+x-x^2})\,dx$ is,

(A) 1
(B) 0
(C) -1
(D) $\pi/4$

19. Area of the region bounded by the curve $y^2 = 4x, y-$ axis and the line $y = 3$ is,

(A) 2
(B) 9/4
(C) 9/3
(D) 9/2

20. Area lying in the Ist quadrant and bounded by the circle $x^2 + y^2 = 4$ and the lines x = 0 and x = 2 is,

(A) π
(B) $\frac{\pi}{2}$
(C) $\frac{\pi}{3}$
(D) $\frac{\pi}{4}$

21. Find the 6th term in the expression of $(4x/5 - 5/2x)^9$

(A) 2021/2
(B) -5040/x
(C) $316/x^2$
(D) 1256/x

22. The vertices of a triangle are A (1, 1), B (4, 5) and C (6, 3), find cos A?

(A) 45/32
(B) 80/10
(C) 63/65
(D) 40/50

23. Find the equation of the line which passes through the points (3, 4) and the sum of its Intercepts on the axes is 14,

(A) x + y = 7, 4x + 3y =24
(B) 2x + 3y =8 , x + y = 2
(C) 2x + 3y =9, 9x + y = 10
(D) 3x + 2y =7, 4x+ y =24

24. Find the value of k, if the straight line 2x+3y+4+k (6x-y+12) =0 is perpendicular to the line 7x+5y-4 =0

(A) 20/7
(B) -29/37
(C) 40/37
(D) 10/37

25. If the equation $6x^2 + 2\alpha xy + 12y^2 + 22x + 31y + 20 = 0$ represents a pair of Straight lines, then find the value of α,

(A) 42/3
(B) 17/2
(C) 19/2
(D) 35/6

26. Find the coordinates of the middle point of the chord which the circle, $x^2 + y^2 + 4x - 2y - 3 = 0$ cut off on the line x-y+2 =0,

(A) (1/2, 1/2)
(B) (3/2, 1/2)
(C) (-3/2, 1/2)
(D) (-1/2, 1/2)

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27. For what value of k does the line 2x-3y =k, touches the parabola y^2 =6x?

(A) 29/4 (B) -27/4 (C) 27/4 (D) 33/6

28. Find the equation of the tangent to the ellipse, $x^2 + 4y^2$ =25 at the points whose Ordinate is 2.

(A) $3x - 8y = 25$ (B) $-3x + 8y = 25$ (C) $2x + 3y = 15$ (D) $2x - 3y = 15$

29. The value of, $\sin\frac{\pi}{5}.\ \text{Sin}\frac{2\pi}{5}.\sin\frac{3\pi}{5}\sin\frac{4\pi}{5}$ is,

(A) 2/16 (B) 4/13 (C) 5/16 (D) 8/13

30. The number of arbitrary constants in the particular solution of a differential equation of third order is,

(A) 3 (B) 2 (C) 1 (D) 0

31. The Integrating factor of the differential equation, $x\frac{dy}{dx}$ -y = $2x^2$ is,

(A) e^{-x} (B) e^{-y} (C) 1/x (D) x

32. Find, $|\vec{x}|$, if for a unit vector $\vec{a}$, $(\vec{x}$ -$\vec{a}$). $(\vec{x}$ + $\vec{a}$) =12.

(A) $\sqrt{13}$ (B) $\sqrt{15}$ (C) 13 (D) 15

33. If ϑ is the angle between any two vectors $\vec{a}$ and $\vec{b}$, then $|\vec{a}.\vec{b}| = |\vec{a} \times \vec{b}|$ when is equal to

(A) 0 (B) $\pi/4$ (C) $\pi/2$ (D) π

34. The algebraic sum of deviations of 8, 1, 6, from A.M. viz, 5 is

(A) -1 (B) 0 (C) 1 (D) -2

35. The Arithmetic Mean of 1, 3, 5, 6, x, 10 is 6.The value of x is,

(A) 10 (B) 11 (C) 12 (D) 15

36. Solution of Differential Equation, tan y $\sec^2$ x dx + tan x $\sec^2$ y dy =0 is,

(A) tan x+ tan y = K (B) tan x – tan y = k (C) tan x/ tan y= k (D) tan x. tan y=k

37. The first term of G.P. is 1. The sum of the 3^{rd} & 5^{th} term is 90. Then the common ratio is,

(A) 1 (B) 2 (C) 3 (D) 4

38. The next term of the given sequence 1, 5, 14, 30, 55, --- is,

(A) 80 (B) 90 (C) 91 (D) 96

39. The probability of obtaining an even prime number on each die, when a pair of dice is rolled is,

(A) 0 (B) 1/3 (C) 1/12 (D) 1/36

40. Suppose that two cards are drawn at random from a deck of cards. Let X be the number of aces obtained. Then the value of E(X) is,

(A) 37/22 (B) 5/13 (C) 1/13 (D) 2/13

41. Find the mean number of heads in three tosses of a fair coin,

(A) 2.5 (B) 1.5 (C) 1 (D) 2

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42. The value of $\int_a^b x^5$ dx is equal to,

(A) $\tan\frac{x}{2}+k$ (B) $\frac{1}{2}\tan\frac{x}{2}+k$ (C) $2\tan\frac{x}{2}+k$ (D) $\tan^2\frac{x}{2}+k$

43. $\int_{-2}^{2}|x|$ dx is equal to,

(A) 0 (B) 2 (C) 1 (D) 4

44. What is the value of $\int_1^e \frac{1+\log x}{x}\,dx$?

(A) 3/2 (B) ½ (C) e (D) 1/e

45. The smallest integer function f(x) =$[x]$ is,

(A) One-One (B) Many-One (C) Both (D) None

46. IF P (A ∩ B) =70% and P(B) =85% then P(A/B) is equal to,

(A) 14/17 (B) 17/20 (C) 7/8 (D) 1/8

47. If P (A) =0.4, P(B)=0.7 and P(B/A) =0.6 then find P(A ∪ B) ?

(A) 0.46 (B) 0.86 (C) 0.76 (D) 0.54

48. The probability of obtaining an even prime number on each die, when a pair of dice is rolled is,

(A) 0 (B) 1/3 (C) 1/12 (D) 1/36

49. If y=$\sqrt{\sin x+y}$ then $\frac{dy}{dx}$ is equal to,

(A) $\frac{\cos x}{2y-1}$ (B) $\frac{\cos x}{1-2y}$ (C) $\frac{\sin x}{1-xy}$ (D) $\frac{\sin x}{2y-1}$

50. The value of $\frac{dy}{dx}$ (cot x) is,

(A) tan x (B) $-\sec^2 x$ (C) $-\operatorname{cosec}^2 x$ (D) $\operatorname{cosec}^2 x$

51. If $x=t^2$, $y=t^3$ then d^2y/dx^2 is equal to,

(A) 3/2 (B) 3/4t (C) 3/2t (D) 3t/2

52. The value of C in Role's theorem for the function, f(x) = sin 2x in $[0,\pi/2]$ is,

(A) $\pi/4$ (B) $\pi/6$ (C) $\pi/2$ (D) $\pi/3$

53. If $x^y.y^x = 16$ then $\frac{dy}{dx}$ at (2, 2) is,

(A) 0 (B) 1 (C) -1 (D) -3

54. The value of $\int\frac{dx}{1+\cos x}$ is equal to,

(A) $\tan\frac{x}{2}+k$ (B) $\frac{1}{2}\tan\frac{x}{2}+k$ (C) $2\tan\frac{x}{2}+k$ (D) $\tan^2\frac{x}{2}+k$

55. What is the magnitude of vector 3i + 4j?

(A) $\sqrt{34}$ (B) $\sqrt{32}$ (C) $\sqrt{8}$ (D) $\sqrt{16}$

56. The slope of the regression line of Y on X is also called the,

(A) Correlation Coefficient of X on Y (B) Correlation Coefficient of Y on X

(C) Regression Coefficient of X on Y (D) Regression Coefficient of Y on X

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57. When two variables change in the same direction, then such a Correlation is called

(A) Negative (B) Positive (C) No Correlation (D) All of above

58. The center of the ellipse $(x + y - 2)^2 /9 + (x - y)^2 /16 = 1$ is

(A) (0, 0) (B) (0, 1) (C) (1, 0) (D) (1, 1)

59. The coefficient of x in the expansion of $(1 - 2x + 3x^2 - 4x^3 + ...n)$ is

(A) (2n)! /n!

(B) $(2n)! /(n!)^2$

(C) $(2n)! / \{2x (n!)^2\}$

(D) (4n)! /n!

60. The straight line $(x-2) + (y + 3) = 0$ cuts the circle $(x - 2)^2 + (y - 3)^2 = 11$ at

(A) No points (B) Two points (C) One point (D) Three points

x-x-x

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