Sr. No. : 151452

CET (UG) – 2017

Booklet Series Code : A

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

(In Figures) (In Words)

Roll No. : | | | | | | | .....

O.M.R. Answer Sheet Serial No. : | | | | | | |

Signature of the Candidate : .....

Subject : MATHEMATICS

Time : 70 Minutes] **[Maximum Marks : 120**

No. of Questions : 60] **[Total No. of Printed Pages : 16**

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

INSTRUCTIONS :

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel pen.**
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
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 answers (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 Point/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 Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th 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. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" 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, shall be of the candidate only.**
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. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance 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.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculators is not allowed.**

1. If P and Q are two non-empty subsets of a set X such that P is not a subset of Q, then :

(A) P is a subset of the complement of Q

(B) Q is a subset of P

(C) P and Q are disjoint

(D) P and the complement of Q are no disjoint

2. If a set P has n elements, then the number of elements in the power set P is :

(A) n^2 (B) 2^n

(C) 2^{2n} (D) 2^{n+1}

3. If sets P and Q are defined as $P = \{(x,y), y = e^x, x \in \Re\}$; $Q = \{(x,y), y = x, x \in \Re\}$, then :

(A) $Q \subset P$ (B) $P \subset Q$

(C) $P \cap Q = \phi$ (D) $P \cup Q = P$

4. If $f_1(x)$ and $f_2(x)$ are defined on a domain D_1 and D_2, respectively, then domain of $f_1(x) + f_2(x)$ is :

(A) $D_1 \cap D_2$ (B) $D_1 \cup D_2$

(C) $D_1 - D_2$ (D) $D_2 - D_1$

5. Let $n(P) = 4$ and $n(Q) = 5$. The number of all possible injections from P to Q is :

(A) 9 (B) 120

(C) 24 (D) 30

6. Let S be a set containing 10 distinct elements, then the total number of distinct functions from S to S is :

(A) $\angle 10$ (B) 10^{10}

(C) 2^{10} (D) $2^{10}-1$

7. If $0 \le x \le \frac{\pi}{2}$ and $81^{\sin^2 x} + 81^{\cos^2 x} = 30$, then x is equal to :

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{2}$

(C) $\frac{\pi}{4}$ (D) 0

8. The value of the expression $\frac{\cot x - \tan x}{\cot 2x}$ is :

(A) 1 (B) 2

(C) -1 (D) 4

9. The value of $\sqrt{3}\operatorname{cosec} 20^\circ - \sec 20^\circ$ is equal to :

(A) 2 (B) $\frac{2\sin 20^\circ}{\sin 40^\circ}$

(C) 4 (D) $\frac{2\sin 40^\circ}{\sin 20^\circ}$

10. If $\frac{1}{2\times 4} + \frac{1}{4\times 6} + \frac{1}{6\times 8} + \ldots\ldots$ n terms $= \frac{kn}{n+1}$, then k is equal to :

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

(C) 1 (D) $\frac{1}{8}$

11. If Z is a complex number, then $|Z-8| \leq |Z-2|$ implies :

(A) $Re(Z) \geq 5$ (B) $Re(Z) > 5$

(C) $Re(Z) \leq 5$ (D) $Re(Z) = 5$

12. The minimum value of $|2Z-1|+|3Z-2|$ is :

(A) $\frac{1}{3}$ (B) 0

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

13. The inequality $3-2x < 4x-5$ has solution as the set of all real numbers when :

(A) $x < \frac{4}{3}$ (B) $x \geq \frac{4}{3}$

(C) $x = \frac{4}{3}$ (D) $x > \frac{4}{3}$

14. How many 5-digits telephone numbers can be constructed using the digits 0 to 9, if each number starts with 67 and no digit appears more than once ?

(A) 335 (B) 336

(C) 338 (D) 340

15. Every body in a room shakes hands with every body else. The total number of hands shake is 66. The total number of persons in the rooms is :

(A) 11 (B) 12

(C) 13 (D) 14

16. The term independent of x in the expansion of $\left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^9$ is :

(A) $\frac{7}{18}$ (B) $\frac{5}{18}$

(C) $\frac{11}{18}$ (D) $\frac{13}{18}$

17. If $x = (99)^{50} + (100)^{50}$ and $y = (101)^{50}$, then :

(A) $x > y$ (B) $y > x$

(C) $x = y$ (D) $x - y > xy$

18. The value of the expression ${}^{17}C_4 + \sum_{j=1}^{5} {}^{52-j}C_3$ is equal to :

(A) ${}^{47}C_5$ (B) ${}^{52}C_5$

(C) ${}^{52}C_4$ (D) ${}^{51}C_3$

19. If x, 1, z are in A. P. and x, 2, z are in G. P., then x, 4, z are in :

(A) A.P. (B) H.P.

(C) G.P. (D) None of these

20. If the sum of the series $1 + \frac{2}{x} + \frac{4}{x^2} + \frac{8}{x^3} + \ldots\ldots\ldots\ldots$ is a finite number, then :

(A) $x < 2$ (B) $x > -2$

(C) $x > \frac{1}{2}$ (D) $x = 2$

21. Sum of n terms of the series $1^3 + 3^3 + 5^3 + 7^3 + ...$ is :

(A) $n^2(2n^2 - 1)$ (B) $n^3(n - 1)$

(C) $n^3 + 8n + 4$ (D) $2n^4 + 3n^2$

22. The points P = (1, 2), Q = (2, 4) and R = (4, 8) form a/an :

(A) isosceles triangle (B) equilateral triangle

(C) straight line (D) right-angle triangle

23. If the three points $(3q, 0)$, $(0, 3p)$ and (1, 1) are collinear, then which one is true ?

(A) $\frac{1}{p} + \frac{1}{q} = 0$ (B) $\frac{1}{p} + \frac{1}{q} = 1$

(C) $\frac{1}{p} + \frac{1}{q} = 3$ (D) $\frac{1}{p} + \frac{3}{q} = 1$

24. If P = (1, 0), Q = (–10) and R = (2, 0) are three given points, then the locus of a given points S satisfy the relation $SQ^2 + SR^2 = 2SP^2$ is a :

(A) a straight line parallel to x-axis

(B) a circle passing through origin

(C) a circle with the centre at the origin

(D) a straight line parallel to y-axis

25. The least and the greatest distances of the point (10, 7) from the circle $x^2 + y^2 - 4x - 2y - 20 = 0$ are :

(A) 5, 10 (B) 15, 20

(C) 12, 16 (D) 5, 15

26. The circle $(x-1)^2 + (y-2)^2 = 16$ and $(x+4)^2 + (y+3)^2 = 1$:

(A) touch each other (B) are coaxial

(C) intersects each other (D) none of these

27. The axis of the parabola $9y^2 - 16x - 12y - 57 = 0$ is :

(A) $y = 3$ (B) $x + 3y = 3$

(C) $2x = 3$ (D) $3y = 2$

28. If the length of the major axis of the ellipse is three times the length of its minor axis, then its eccentricity is :

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

(C) $\frac{1}{\sqrt{2}}$ (D) $\frac{2\sqrt{2}}{3}$

29. The latus rectum of a hyperbola $9x^2 - 16y^2 + 72x - 32y - 16 = 0$ is :

(A) $\frac{9}{2}$ (B) $-\frac{9}{2}$

(C) $\frac{32}{3}$ (D) $-\frac{32}{3}$

30. If the line joining the points (4, –2, 3) and (–5, 4, 0) passes through $(a, b, 2)$, then :

(A) $a = 0, b = 1$ (B) $a = 1, b = 1$

(C) $a = 1, b = 0$ (D) $a = 0, b = 0$

31. The distance of the point (1, –5, 9) from the plane $x - y + z = 5$ measured along the line $x = y = z$ is :

(A) $3\sqrt{10}$ (B) $10\sqrt{3}$

(C) $\frac{10}{\sqrt{3}}$ (D) $\frac{20}{3}$

32. The product of n positive numbers is unity. Then their sum is :

(A) a positive integer (B) divisible by n

(C) equal to $n+\frac{1}{n}$ (D) never less than n

33. The contra positive of the statement if "$4x - 2 = 10$ then $x = 3$" is :

(A) if $x = 3$ then $4x - 2 = 10$ (B) if $4x - 2 \neq 10$ then $x \neq 3$

(C) if $x \neq 3$, then $4x - 2 \neq 10$ (D) none of these

34. The mean of 5 observations is 4.4 and variance is 8.24. If the three of the five observations are 1, 2 and 6, then the other two observations are :

(A) 3, 4 (B) 7, 4

(C) 9, 4 (D) 9, 9

35. Mean deviation of 6, 8, 12, 15, 10, 9 through mean is :

(A) 10 (B) 2.33

(C) 3.33 (D) 4.33

36. The principal value of $\sin^{-1}\left[-\frac{\sqrt{3}}{2}\right]$ is :

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

(C) $\frac{4\pi}{3}$ (D) $\frac{5\pi}{3}$

37. The value of $\left[\cos^{-1}\frac{4}{3}+\tan^{-1}\frac{2}{3}\right]$ is equal to :

(A) $\frac{6}{17}$ (B) $\frac{7}{16}$

(C) $\frac{17}{6}$ (D) $\frac{7}{17}$

38. If $P=\begin{bmatrix} d_1 & 0 & 0 \\ 0 & d_2 & 0 \\ 0 & 0 & d_3 \end{bmatrix}$, then Adjoint (P) is equal to :

(A) $\begin{bmatrix} d_1^{-1} & 0 & 0 \\ 0 & d_2^{-1} & 0 \\ 0 & 0 & d_3^{-1} \end{bmatrix}$ (B) $\begin{bmatrix} d_2d_3 & 0 & 0 \\ 0 & d_1d_3 & 0 \\ 0 & 0 & d_1d_2 \end{bmatrix}$

(C) $\begin{bmatrix} d_2d_2 & 0 & 0 \\ 0 & d_1d_3 & 0 \\ 0 & 0 & d_1d_3 \end{bmatrix}$ (D) $\begin{bmatrix} d_1d_3 & 0 & 0 \\ 0 & d_2d_3 & 0 \\ 0 & 0 & d_1d_2 \end{bmatrix}$

39. If $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$, then $\begin{bmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{bmatrix}$ is equal to :

(A) 0 (B) $-abc$

(C) abc (D) $a+b+c$

40. If P is any square matrix, then the matrix $(P + P^T)$ will be :

(A) diagonal (B) symmetric

(C) skew-symmetric (D) identity

41. The following system of linear equations has :

$$x + 2y + 3z = 1; 2x + y + 3z = 2; 5x + 5y + 9z = 4$$

(A) a unique solution
(B) infinitely many solutions
(C) no solution
(D) exactly three solutions

42. If $f(x) = (1 - x) \tan \frac{\pi x}{2}$, then $\lim\limits_{x \to 1}$ it $f(x)$ is equal to :

(A) $\frac{\pi}{2}$
(B) $\frac{2}{\pi}$
(C) 0
(D) 1

43. If $f(5) = 7$ and $f'(5) = 7$, then $\lim\limits_{x \to 5} \frac{xf(5) - 5f(x)}{x - 5}$ is equal to :

(A) 35
(B) –35
(C) 28
(D) –28

44. The graph of the function $y = f(x)$ has a unique tangent at the point $(a, 0)$ through the graph passes. Then, $\lim\limits_{x \to a} \frac{[\log_e(1 + 6f(x))]}{3f(x)}$ is equal to :

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

45. Let $y = x^2 e^{-x}$, then the interval in which y increases with respect to x is :

(A) $(-\infty, \infty)$
(B) $(-2, 0)$
(C) $(2, \infty)$
(D) $(0, 2)$

46. If the line $ax + by + c = 0$ is a normal to the curve $xy = 1$, then :

(A) $a > 0, b > 0$ (B) $a > 0, b < 0$

(C) $a > 0, b = 0$ (D) $a < 0, b < 0$

47. The value of c in Lagrange's mean value theorem for the function $f(x)=\log(\sin x)$ in the interval $\left[\frac{\pi}{6}, \frac{5\pi}{6}\right]$ is :

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

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

48. Let $P(x) = a_0 + a_1x^2 + a_2x^4 + \ldots\ldots\ldots + a_nx^{2n}$ be a polynomial in a real variable x with $0 < a_0 < a_1 < a_2 < \ldots\ldots\ldots < a_n$. The function $P(x)$ has :

(A) neither a maxima nor a minima (B) only one maximum

(C) only one minimum (D) one maxima and one minima

49. If $\int \frac{dx}{5+4\sin x} = a\tan^{-1}\left[b\tan\frac{x}{2} + \frac{4}{3}\right] + c$, then :

(A) $a = \frac{2}{3}$ (B) $a = \frac{1}{3}$

(C) $b = \frac{5}{3}$ (D) $b = \frac{2}{3}$

50. The integral $\int \frac{2x^{12}+5x^9}{(x^5+x^3+1)^3}dx$ is equal to :

(A) $-\frac{x^5}{(x^5+x^3+1)^2} + c$ (B) $\frac{x^{10}}{2(x^5+x^3+1)^2} + c$

(C) $\frac{x^5}{2(x^5+x^3+1)^2} + c$ (D) $\frac{-x^{10}}{2(x^5+x^3+1)^2} + c$

51. The value of $\int_{-200}^{200} (ax^3 + bx + c)\,dx$ depends on the value(s) of :

(A) b only
(B) c only
(C) a only
(D) both a and b

52. The area bounded by the curve $y^2 = 8x$ and $x^2 = 8y$ is :

(A) $\frac{32}{7}$
(B) $\frac{24}{5}$
(C) $\frac{72}{3}$
(D) $\frac{64}{3}$

53. The degree of a differential equation $\left\{1+\frac{dy}{dx}\right\}^5 = \left\{\frac{d^2y}{dx^2}\right\}^2$ is equal to :

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

54. The differential equation $\sec^2 y \frac{dy}{dx} + \tan xy = x^3$ is :

(A) non-linear differential equation
(B) linear differential equation
(C) homogeneous differential equation
(D) linear and homogeneous differential equation

55. The vectors $2\hat{i} + 3\hat{j} - 4\hat{k}$ and $a\hat{i} + b\hat{j} + c\hat{k}$ are perpendicular when :

(A) $a = 2, b = 3, c = -4$
(B) $a = 4, b = 4, c = 5$
(C) $a = 4, b = 4, c = -5$
(D) $a = 4, b = 3, c = -5$

56. The volume of a parallelopiped whose sides are given by $\vec{OA}=2\hat{i}-3\hat{j}$, $\vec{OB}=\hat{i}+\hat{j}-\hat{k}$ and $\vec{OC}=3\hat{i}-\hat{k}$ is :

(A) 1 (B) 4

(C) $\frac{2}{7}$ (D) $\frac{7}{2}$

57. In linear programming, objective function and objective constraints are :

(A) solved (B) quadratic

(C) linear (D) adjacent

58. For linear inequalities, solution set for a group of inequalities is classified as :

(A) concave set (B) convex set

(C) loss set (D) profit set

59. An urn contains 8 red and 5 white balls. Three balls are drawn at random. Then, the probability that balls of both colors are drawn is :

(A) $\frac{40}{143}$ (B) $\frac{70}{143}$

(C) $\frac{3}{13}$ (D) $\frac{10}{13}$

60. A coin is tossed 3 times. The probability of obtaining at least two heads will be :

(A) $\frac{3}{8}$ (B) $\frac{1}{2}$

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