Question Booklet Series: **A** *Question Booklet Serial No.* 151260

CET (UG) – 2018

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** **Maximum 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 Point/Black Gel Pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. 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.
5. 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 Point/Black Gel Pen.**
6. 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.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. **Negative marking will be adopted for evaluation i.e. $1/4^{th}$ of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.**
9. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
10. For rough work only the blank sheet at the end of the Question Booklet be used.
11. 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.**
12. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
13. 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.
14. 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.
15. **Tele-communication equipment such as Cellular phones, pager, wireless, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
16. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

1. **Let $S = \{1,,2,3,4\}$. The total number of un-ordered pairs of disjoint subsets of a set S is equal to**

A) 25 B) 34 C) 41 D) 42

2. **If $n(A)=1000$, $n(B)=500$ and if $n(A \cap B) \geq 1$ and $n(A \cup B) = p$, then**

A) $500 \leq p \leq 1000$ B) $1001 \leq p \leq 1498$

C) $999 \leq p \leq 1499$ D) $1000 \leq p \leq 1499$

3. **If $f : \Re \to \Re$ satisfies $f(x+y) = f(x) + f(y)$, for all $x, y \in \Re$ and $f(1)=10$, then $\sum_{r=1}^{n} f(r)$**

A) $5n$ B) $5(n+1)$ C) $10n(n+1)$ D) $5n(n+1)$

4. **If $\Re$ is a relation on the set $S = \{1,2,3,4,5,6,7,8,9\}$ given by $x \Re y \Leftrightarrow y = 3x$, then $\Re O \Re^{-1}$ is**

A) $\{(1,3),(2,6),(3,9)\}$ B) $\{(1,1),(2,2),(3,3)\}$

C) $\{(3,3),(6,6),(9,9)\}$ D) None of these

5. **Let the function $f : \Re \to \Re$ be defined by $f(x) = 2x + \sin x$ for all $x \in \Re$. Then $f(x)$ is**

A) One-to-one and onto B) One-to-one but not onto

C) Onto but not one-to-one D) Neither one-to-one nor onto

6. **If $f : [1, \infty) \to [2, \infty)$ is given by $x + \frac{1}{x}$, then $f^{-1}(x)$ equals**

A) $\frac{x+\sqrt{x^2-4}}{2}$ B) $\frac{x}{1+x^2}$ C) $1+\sqrt{x^2-4}$ D) $\frac{x-\sqrt{x^2-4}}{2}$

7. **The number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2\sin^2 x + 5\sin x - 3 = 0$ is equal to**

A) 6 B) 4 C) 2 D) 1

8. **The value of $\frac{\sin 55^\circ - \cos 55^\circ}{\sin 10^\circ}$ is equal to**

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

9. **If** $1+\sin x+\sin^2 x+------+\infty=4+2\sqrt{3}, 0<x<\pi$**, then** x **is equal to**

A) $\frac{\pi}{6}$ B) $\frac{\pi}{3}$ C) $\frac{\pi}{3}$ or $\frac{\pi}{6}$ D) $\frac{\pi}{3}$ or $\frac{2\pi}{3}$

10. **In a** ΔABC **:** $\operatorname{cosec} A(\sin B\cos C+\cos B\sin C)$ **is equal to**

A) $\frac{c}{a}$ B) $\frac{a}{c}$ C) 1 D) 0

11. **The value of** $\tan\left[\cos^{-1}\frac{4}{5}+\tan^{-1}\frac{2}{3}\right]$ **is equal to**

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

12. **The sides of a triangle are** $a, b, \sqrt{a^2+ab+b^2}$ **, then the greatest angle is**

A) 120° B) 90° C) 60° D) 135°

13. **The complex numbers:** $\sin x+i\cos 2x$ **and** $\cos x+i\sin 2x$ **are conjugate to each other for**

A) $x=n\pi$ B) $x=\left(n+\frac{1}{2}\right)\pi$ C) $x=0$ D) No value of x

14. **The points** z_1, z_2, z_3, z_4 **in the complex plane are the vertices of a parallelogram taken in order if and only if**

A) $z_1+z_4=z_2+z_3$ B) $z_1+z_3=z_2+z_4$ C) $z_1+z_2=z_3+z_4$ D) $z_1z_3=z_2z_4$

15. **If** $\omega^3=1$ **and** $\omega\neq1$**, then** $(1+\omega)(1+\omega^2)(1+\omega^4)(1+\omega^8)$ **is equal to**

A) 3 B) -3 C) 9 D) 1

16. **Let** z **be a complex number such that the imaginary part of** z **is non-zero and** $p=z^2+z+1$ **is real. Then '** p **' can not take the value**

A) $\frac{3}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) -1

17. **Both the roots of the equation:** $(x-b)(x-c)+(x-c)(x-a)+(x-a)(x-b)=0$**, are**

A) Positive B) Negative C) Real D) Complex conjugate

18. **If the roots of the equation:** $x^3-12x^2+39x-28=0$ **are in AP, then their common difference will be**

A) ±1 B) ±2 C) ±3 D) ±4

19. **A value of b for which the equations: $x^2+bx-1=0$ and $x^2+x+b=0$ have one root in common is**

A) $-\sqrt{2}$ B) $-i\sqrt{3}$ C) $i\sqrt{5}$ D) $\sqrt{2}$

20. **If $|2x-3|<|x+5|$, then x lies in the interval**

A) $(-3,5)$ B) $\left(-\frac{2}{3},8\right)$ C) $\left(-8,\frac{2}{3}\right)$ D) $\left(-5,\frac{2}{3}\right)$

21. **Let $a_1,a_2,a_3,---$ be terms of an AP. If $\frac{a_1+a_2+---+a_p}{a_1+a_2+---+a_q}=\frac{p^2}{q^2}, p\neq q$, then $\frac{a_6}{a_{21}}$ is equal to**

A) $\frac{7}{2}$ B) $\frac{11}{41}$ C) $\frac{2}{7}$ D) $\frac{41}{11}$

22. **The fifth term of a GP is 2, then the product of its 9 terms is**

A) 256 B) 512 C) 1024 D) 526

23. **The sum of the series: $1+\frac{1}{3}+\frac{1.3}{3.6}+\frac{1.3.5}{3.6.9}+\frac{1.3.5.7}{3.6.9.12}+---$ is**

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

24. **${}^nC_0-{}^nC_1+{}^nC_2-{}^nC_3+---+(-1)^n\,{}^nC_n$ is equal to**

A) 2^n B) 2^n-1 C) 0 D) 2^{n-1}

25. **If $(1+px)^n=1+6x+\frac{27}{2}x^2+---+p^nx^n$, then the values of p and n are given by**

A) $(2,3)$ B) $(3,2)$ C) $\left(\frac{3}{2},4\right)$ D) $\left(\frac{3}{2},6\right)$

26. **The coefficient of the middle term in the expansion of $(x+2y)^6$ is**

A) $8\,{}^6C_3$ B) $8\,{}^6C_3$ C) ${}^6C_4$ D) $8\,{}^6C_4$

27. **Ten different letters of an alphabet are given. Words with 5 letters are formed from these given letters. Then, the number of words which have at least one letter repeated is**

A) 69460 B) 69760 C) 69000 D) 99748

28. A five-digit number divisible by 3 is to be formed using the numbers 0, 1, 2, 3, 4 and 5 without repetition. The total number of ways this can be done is

A) 216 B) 240 C) 600 D) 3125

29. If $^{n-1}C_3 + ^{n-1}C_4 > ^nC_3$, then n just greater than integer

A) 5 B) 6 C) 4 D) 7

30. A triangle with vertices $(4,0), (-1,-1)$ and $(3,5)$ is

A) Isosceles and right angled B) Isosceles but not right angled

C) Right angled but not isosceles D) Neither isosceles nor right angled

31. The equation: $\sqrt{\left[(x-2)^2+y^2\right]}+\sqrt{\left[(x+2)^2+y^2\right]}=4$, represents

A) Pair of lines B) Circle C) A parabolid D) An ellipse

32. If non-zero numbers a, b and c are in HP, then the straight line $\frac{x}{a}+\frac{y}{b}+\frac{1}{c}=0$ always passes through a fixed point. That point is

A) $\left(1,-\frac{1}{2}\right)$ B) $(1,-2)$ C) $(-1,-2)$ D) $(-1,2)$

33. A circle C passes through the point $(0,1)$ and is orthogonal to the circles $(x-1)^2+y^2=16$ and $x^2+y^2=1$. Then

A) Radius of C is 8 B) Radius of C is 6

C) Centre of C is $(-7,1)$ D) centre of C $(-8,1)$

34. If the two circles $(x-1)^2+(y-3)^2=r^2$ and $x^2+y^2-8x+2y+8=0$ intersect in two distinct points, then

A) $2<r<8$ B) $r<2$ C) $r=2$ D) $r>2$

35. Let (x,y) be any point on the parabola $y^2=4x$. If P is the point that divides the line segment $(0,0)$ to (x,y) in the ratio $1:3$, then, the locus of P is

A) $x^2=y$ B) $y^2=2x$ C) $y^2=x$ D) $x^2=2y$

36. If t_1 and t_2 are the parameters of the end points of a focal chord for the parabola $y^2=4ax$, then which one is correct?

A) $t_1t_2=1$ B) $t_1=t_2$ C) $t_1t_2=-1$ D) $t_1+t_2=-1$

37. The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ and having centre at $(0,3)$ is

A) $x^2+y^2-6y-7=0$ B) $x^2+y^2-6y+7=0$

C) $x^2+y^2-6y-5=0$ D) $x^2+y^2-6y+5=0$

38. In an ellipse, the distances between its foci is 6 and minor axis is 8. Then, its eccentricity is

A) $\frac{1}{2}$ B) $\frac{3}{5}$ C) $\frac{4}{5}$ D) $\frac{1}{\sqrt{5}}$

39. The value of m, for which the line $y=mx+2$ is a tangent to the hyperbola $4x^2-9y^2=36$ are

A) $\pm\frac{4\sqrt{2}}{3}$ B) $\pm\frac{2}{3}$ C) $\pm\frac{8}{9}$ D) $\pm\frac{2\sqrt{2}}{3}$

40. The distance of the point $(1,0,2)$ from the point of intersection of the line: $\frac{x-2}{3}=\frac{y+1}{4}=\frac{z-2}{12}$ and the plane $x-y+z=16$ is

A) $2\sqrt{14}$ B) 8 C) $3\sqrt{21}$ D) 13

41. The statement $p\rightarrow(q\rightarrow p)$ is equivalent to

A) $p\rightarrow(p\leftrightarrow q)$ B) $p\rightarrow(p\rightarrow q)$ C) $p\rightarrow(p\vee q)$ D) $p\rightarrow(p\wedge q)$

42. If in a frequency distribution, the mean and median are 21 and 22 respectively, then its mode is approximately

A) 24.0 B) 25.5 C) 20.5 D) 22.0

43. The mean of n terms is $\bar{x}$. If the first term is increased by 1, second by 2 and so on, then the new mean is

A) $\bar{x}+n$ B) $\bar{x}+\frac{n}{2}$ C) $\bar{x}+\frac{n+1}{2}$ D) $\bar{x}$

44. Three boys and two girls stand in a queue. The probability that the number of boys ahead of every girl is at least one more than the number of girls ahead of her is

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{2}{3}$ D) $\frac{3}{4}$

45. **Let** $\omega=-\frac{1}{2}+i\frac{\sqrt{3}}{2}$**. Then, the value of the determinant** $\begin{vmatrix} 1 & 1 & 1 \\ 1 & -1-\omega^2 & \omega^2 \\ 1 & \omega^2 & \omega^4 \end{vmatrix}$ **is**

A) 3ω B) $3\omega(\omega-1)$ C) $3\omega^2$ D) $3\omega(1-\omega)$

46. **The number of values of** k **for which the system of equations:** $(k+1)x+8y=4k$, $kx+(k+3)y=3k-1$ **has infinitely many solutions is**

A) 0 B) 1 C) 2 D) Infinite

47. **If** $\lim_{x\to 0}\frac{\ln(5+x)-\ln(5-x)}{x}=k$**, then the value of** k **is**

A) 0 B) $-\frac{1}{5}$ C) $\frac{2}{5}$ D) $-\frac{2}{5}$

48. **If** $f(a)=2$, $g(a)=-1$, $f'(a)=1$ **and** $g'(a)=2$**, then the value of**

$\lim_{x\to a}\frac{[f(x)g(a)-f(a)g(x)]}{x-a}$ **is**

A) 5 B) $\frac{1}{5}$ C) $-\frac{1}{5}$ D) -5

49. **In order that the function** $f(x)=(x+1)^{\cot x}$ **is continuous at** $x=0$, $f(0)$ **must be defined as**

A) $f(0)=0$ B) $f(0)=e$ C) $f(0)=\frac{1}{e}$ D) $f(0)=1$

50. **The value of the derivative of** $|x-1|+|x-3|$ **at** $x=2$ **is**

A) -2 B) 0 C) 2 D) 4

51. **If** $f(x)=\frac{x}{\sin x}$ **and** $g(x)=\frac{x}{\tan x}$**, where** $0<x\le 1$**, then in this interval**

A) Both $f(x)$ and $g(x)$ are increasing functions

B) Both $f(x)$ and $g(x)$ are decreasing functions

C) $f(x)$ is an increasing function

D) $g(x)$ is an increasing function

52. **The value of** $\int_1^2 e^x\left[\frac{1}{x}-\frac{1}{x^2}\right]dx$ **is equal to**

A) $e\left(\frac{1}{2}e-1\right)$ B) $e(e-1)$ C) 0 D) $\left(\frac{1}{2}e-1\right)$

53. **If** $\int_0^1 e^{x^2}(x-\alpha)dx=0$, **then**

A) $1<\alpha<2$ B) $\alpha<0$ C) $0<\alpha<1$ D) $\alpha=0$

54. **The value of the integral** $\int_0^1 \cot^{-1}\left[1-x+x^2\right]dx$ **is**

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

55. **The area bounded by the curve** $x^2=4y$ **and the straight line:** $x=4y-2$ **is**

A) $\frac{9}{5}\,sq.units$ B) $\frac{8}{9}\,sq.units$ C) $\frac{5}{9}\,sq.units$ D) $\frac{9}{8}\,sq.units$

56. **The order and degree of a differential equation:** $\sqrt{1+\frac{dy}{dx}}=\frac{d^2y}{dx^2}$ **is**

A) $\left(2,\frac{1}{2}\right)$ B) $(2,2)$ C) $(2,1)$ D) $(2,4)$

57. **The differential equation of the family of curves:** $y=Pe^{2x}+Qe^{-2x}$ **for different values of** P **and** Q **is**

A) $\frac{d^2x}{dy^2}=4x$ B) $\left(\frac{dx}{dy}\right)^2=4y$ C) $\frac{d^2y}{dx^2}=4y$ D) $\frac{d^2y}{dx^2}=xy$

58. **If** $\vec{p}$ **and** $\vec{q}$ **are two unit vectors such that** $\vec{p}+2\vec{q}$ **and** $5\vec{p}-4\vec{q}$ **are perpendicular to each other, then the angle between** $\vec{p}$ **and** $\vec{q}$ **is**

A) 45° B) 60° C) $\cos^{-1}\left(\frac{1}{3}\right)$ D) $\cos^{-1}\left(\frac{2}{7}\right)$

59. **Let** $\vec{p} = \hat{i} - \hat{k}$, $\vec{q} = x\hat{i} + \hat{j} + (1-x)\hat{k}$ **and** $\vec{r} = y\hat{i} + x\hat{j} + (1+x-y)\hat{k}$. **Then** $\left|\vec{p}\ \vec{q}\ \vec{r}\right|$ **depends on**

A) Only on x

B) Only on y

C) Neither on x nor on y

D) Both on x and y

60. **The maximum value of** $z = 3x + 4y$ **subject to** $2x + 2y \le 80, 2x + 4y \le 120, x, y \ge 0$ **is**

A) 120

B) 130

C) 140

D) 150

x-x-x