DOs:
1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR Answer Sheet.
2. This question booklet is issued to you by the invigilator after the 2nd bell i.e., after 2.30 pm.
3. The Version Code / Serial Number of this question booklet should be entered on the OMR Answer Sheet and the respective circles should also be shaded completely.
4. Compulsorily affix the complete signature at the bottom portion of the OMR Answer Sheet in the space provided.

DON'Ts:
1. The timing and marks printed on the OMR Answer Sheet should not be damaged / mutilated / spoiled.
2. The 3rd Bell rings at 2.40 pm, till then;
   - Do not remove the seal present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR Answer Sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES
1. This question booklet contains 60 questions and each question will have one statement and four distracters. (Four different options / choices.)
2. After the 3rd Bell is rung at 2.40 pm, remove the seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced immediately by complete test booklet by showing it to Room Invigilator. Read each item and start answering on the OMR Answer Sheet.
3. During the subsequent 70 minutes:
   - Read each question carefully.
   - Choose the correct answer from out of the four available distracters (options / choices) given under each question / statement.
   - Completely darken / shade the relevant circle with a blue or black ink ballpoint pen against the question number on the OMR answer sheet.

Correct Method of shading the circles on the OMR Answer Sheet is:

4. Please note that even a minute unintended ink dot on the OMR Answer Sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR Answer Sheet.
5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR Answer Sheet for the same.
6. After the last bell is rung at 3.50 pm, stop writing on the OMR Answer Sheet and affix your left hand thumb impression on the OMR Answer Sheet as per the instructions.
7. Hand over the OMR Answer Sheet to the room invigilator as it is.
8. After separating the top sheet (KEA copy), the invigilator will return the bottom sheet replica (Candidate’s copy) to you to carry home for self evaluation.
9. Preserve the replica of the OMR Answer Sheet for a minimum period of ONE year.
10. In case of any discrepancy in the English and Kannada versions, the English version will be taken as final.
1. If A and B are finite sets and \( A \subseteq B \), then
   (A) \( n(A \cup B) = n(A) \)  \( n(A \cap B) = n(B) \)
   (B) \( n(A \cup B) = n(B) \)  \( n(A \cap B) = \phi \)
   (C) \( n(A \cup B) = n(B) \)  \( n(A \cap B) = \phi \)
   (D) \( n(A \cup B) = \phi \)  \( n(A \cap B) = \phi \)

2. The value of \( \cos^2 45^\circ - \sin^2 15^\circ \) is
   (A) \( \frac{\sqrt{3}}{2} \)
   (B) \( \frac{\sqrt{3}}{4} \)
   (C) \( \frac{\sqrt{3} + 1}{2 \sqrt{2}} \)
   (D) \( \frac{\sqrt{3} - 1}{2 \sqrt{2}} \)

3. 3 + 5 + 7 + … to n term is
   (A) \( n(n + 2) \)
   (B) \( n(n - 2) \)
   (C) \( n^2 \)
   (D) \( (n + 1)^2 \)

4. If \( \left( \frac{1 + i}{1 - i} \right)^m = 1 \), then the least positive integral value of m is
   (A) 2
   (B) 3
   (C) 4
   (D) 1

5. If \( |x - 2| \leq 1 \), then
   (A) \( x \in [1,3] \)
   (B) \( x \in (1,3) \)
   (C) \( x \in [-1,3] \)
   (D) \( x \in (-1,3) \)

6. If \( \binom{n}{12} = \binom{n}{8} \) then n is equal to
   (A) 26
   (B) 12
   (C) 6
   (D) 20

7. The total number of terms in the expansion of \( (x + a)^{47} - (x - a)^{47} \) after simplification is
   (A) 24
   (B) 47
   (C) 48
   (D) 96
8. Equation of line passing through the point 
(1, 2) and perpendicular to the line \( y = 3x - 1 \) is
\[ (A) \ x + 3y - 7 = 0 \quad (B) \ x + 3y + 7 = 0 \]
\[ (C) \ x + 3y = 0 \quad (D) \ x - 3y = 0 \] 

9. The eccentricity of the ellipse \( \frac{x^2}{36} + \frac{y^2}{16} = 1 \) is
\[ (A) \ \frac{2\sqrt{5}}{6} \quad (B) \ \frac{2\sqrt{5}}{4} \]
\[ (C) \ \frac{2\sqrt{13}}{6} \quad (D) \ \frac{2\sqrt{13}}{4} \] 

10. The perpendicular distance of the point \( P(6, 7, 8) \) from XY-plane is
\[ (A) \ 8 \quad (B) \ 7 \]
\[ (C) \ 6 \quad (D) \ 5 \] 

11. The value of \( \lim_{\theta \to 0} \frac{1 - \cos 4\theta}{1 - \cos 6\theta} \)
is
\[ (A) \ 4/9 \quad (B) \ 9/4 \]
\[ (C) \ 9/3 \quad (D) \ 3/4 \] 

12. The contrapositive statement of the statement “If \( x \) is prime number, then \( x \) is odd” is
\[ (A) \ \text{If} \ x \ \text{is not a prime number, then} \ x \ \text{is not odd} \]
\[ (B) \ \text{If} \ x \ \text{is a prime number, then} \ x \ \text{is not odd.} \]
\[ (C) \ \text{If} \ x \ \text{is not a prime number, then} \ x \ \text{is odd.} \]
\[ (D) \ \text{If} \ x \ \text{is not odd, then} \ x \ \text{is not a prime number.} \]
13. If coefficient of variation is 60 and standard deviation is 24, then Arithmetic mean is
(A) 40  (B) 7/20  (C) 20/7  (D) 1/40

14. The range of the function \( f(x) = \sqrt{9-x^2} \) is
(A) (0, 3)  (B) [0, 3]  (C) (0, 3]  (D) [0, 3)

15. Let \( f: \mathbb{R} \to \mathbb{R} \) be defined by \( f(x) = x^4 \), then
(A) \( f \) is one-one and onto
(B) \( f \) may be one-one and onto
(C) \( f \) is one-one but not onto
(D) \( f \) is neither one-one nor onto

16. The range of \( \sec^{-1}x \) is
(A) \([-\pi, \pi]\)  (B) \([-\pi, \pi]\)
(C) [0, \pi]  (D) [0, \pi) - \{\pi/2\}

17. If \( \tan^{-1}x + \tan^{-1}y = \frac{4\pi}{5} \), then \( \cot^{-1}x + \cot^{-1}y \) is equal to
(A) \( \pi \)  (B) \( \frac{\pi}{5} \)
(C) \( \frac{2\pi}{5} \)  (D) \( \frac{3\pi}{5} \)

18. If \( f(x) = 8x^3 \), \( g(x) = x^{1/3} \), then \( f \circ g(x) \) is
(A) \( 8x \)  (B) \( 8^3x \)
(C) \( (8x)^{1/3} \)  (D) \( 8x^3 \)
19. If \( A = \frac{1}{\pi} \begin{bmatrix} \sin^{-1}(\pi x) & \tan^{-1}\left(\frac{x}{\pi}\right) \\ \sin^{-1}\left(\frac{x}{\pi}\right) & \cot^{-1}(\pi x) \end{bmatrix} \) then \( A - B \) is equal to

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

Question Id: 19

20. If a matrix \( A \) is both symmetric and skew-symmetric, then

(A) \( A \) is diagonal matrix  
(B) \( A \) is a zero matrix  
(C) \( A \) is scalar matrix  
(D) \( A \) is square matrix

Question Id: 20

21. If \( \begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix} \), then the value of \( x \) and \( y \) are

(A) \( x = 3, \ y = 3 \)  
(B) \( x = -3, \ y = 3 \)  
(C) \( x = 3, \ y = -3 \)  
(D) \( x = -3, \ y = -3 \)

Question Id: 21

22. Binary operation \( * \) on \( \mathbb{R} - \{-1\} \) defined by \( a * b = \frac{a}{b + 1} \)

(A) \( * \) is associative and commutative  
(B) \( * \) is associative but not commutative  
(C) \( * \) is neither associative nor commutative  
(D) \( * \) is commutative but not associative

Question Id: 22
23. If \( \begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix} \) then \( x \) is equal to
(A) 2  
(B) 4  
(C) 8  
(D) \( \pm 2 \sqrt{2} \)  

Question Id: 23

24. If \( A \) is a square matrix of order \( 3 \times 3 \), then \( |KA| \) is equal to
(A) \( K|A| \)  
(B) \( K^2|A| \)  
(C) \( K^3|A| \)  
(D) \( 3K|A| \)  

Question Id: 24

25. The area of triangle with vertices \((K, 0), (4, 0), (0, 2)\) is 4 square units, then value of \( K \) is
(A) 0 or 8  
(B) 0 or \(-8\)  
(C) 0  
(D) 8  

Question Id: 25

26. Let \( \Delta = \begin{vmatrix} A & x & 2 & 1 \\ B & y & 2 & 1 \\ C & z & 2 & 1 \end{vmatrix} \) and 
\[ \Delta_1 = \begin{vmatrix} x & y & z \\ zy & zx & xy \end{vmatrix} \] 
then
(A) \( \Delta_1 = -\Delta \)  
(B) \( \Delta_1 = \Delta \)  
(C) \( \Delta_1 \neq \Delta \)  
(D) \( \Delta_1 = 2\Delta \)  

Question Id: 26

27. If \( f(x) = \begin{cases} Kx^2 & \text{if } x \leq 2 \\ 3 & \text{if } x > 2 \end{cases} \) is continuous at \( x = 2 \), then the value of \( K \) is
(A) 3  
(B) 4  
(C) \( \frac{3}{4} \)  
(D) \( \frac{4}{3} \)  

Question Id: 27
28. The value of C in Mean value theorem for the function \( f(x) = x^2 \) in \([2, 4]\) is
   (A) 3  (B) 2
   (C) 4  (D) 7/2

29. The point on the curve \( y^2 = x \) where the tangent makes an angle of \( \pi / 4 \) with X-axis is
   (A) \( \left( \frac{1}{2}, \frac{1}{4} \right) \)  (B) \( \left( \frac{1}{4}, \frac{1}{2} \right) \)
   (C) (4, 2)  (D) (1, 1)

30. The function \( f(x) = x^2 + 2x - 5 \) is strictly increasing in the interval
   (A) \((-1, \infty)\)  (B) \((-\infty, -1)\)
   (C) \([-1, \infty)\)  (D) \((-\infty, -1]\)

31. The rate of change of volume of a sphere with respect to its surface area when the radius is 4 cm is
   (A) 4 cm\(^3\) / cm\(^2\)  (B) 2 cm\(^3\) / cm\(^2\)
   (C) 6 cm\(^3\/)cm\(^2\)  (D) 8 cm\(^3\) / cm\(^2\)

32. If \( y = \tan^{-1}\left( \frac{\sin x + \cos x}{\cos x - \sin x} \right) \), then \( \frac{dy}{dx} \) is equal to
   (A) 1/2  (B) \( \pi / 4 \)
   (C) 0  (D) 1
33. If \( y = \begin{vmatrix} f(x) & g(x) & h(x) \\ l & m & n \\ a & b & c \end{vmatrix} \), then \( \frac{dy}{dx} \) is equal to
(A) \( \begin{vmatrix} f'(x) & g'(x) & h'(x) \\ l & m & n \\ a & b & c \end{vmatrix} \)
(B) \( \begin{vmatrix} f'(x) & g'(x) & h'(x) \\ l & m & n \\ a & b & c \end{vmatrix} \)
(C) \( \begin{vmatrix} f'(x) & 1 & a \\ g'(x) & m & b \\ h'(x) & n & c \end{vmatrix} \)
(D) \( \begin{vmatrix} f'(x) & g'(x) & h'(x) \\ l & m & n \\ a & b & c \end{vmatrix} \)

34. If \( \sin x = \frac{2t}{1+t^2}, \tan y = \frac{2t}{1-t^2} \), then \( \frac{dy}{dx} \) is equal to
(A) 1
(B) 0
(C) -1
(D) 2

35. The derivative of \( \cos^{-1}\left(2x^2 - 1\right) \) w.r.t \( \cos^{-1} x \) is
(A) 2
(B) \( \frac{-1}{2\sqrt{1-x^2}} \)
(C) \( \frac{2}{x} \)
(D) \( 1-x^2 \)
36. If \( y = \log(\log x) \) then \( \frac{d^2 y}{dx^2} \) is equal to

(A) \( \frac{-1 + \log x}{(x \log x)^2} \)

(B) \( \frac{-1 + \log x}{x^2 \log x} \)

(C) \( \frac{1 + \log x}{(x \log x)^2} \)

(D) \( \frac{1 + \log x}{x^2 \log x} \)

37. \( \int \frac{(x+3)e^x}{(x+4)^2} \ dx \) is equal to

(A) \( \frac{1}{(x+4)^2} + C \)

(B) \( \frac{e^x}{(x+4)^2} + C \)

(C) \( \frac{e^x}{(x+4)} + C \)

(D) \( \frac{e^x}{x+3} + C \)

38. \( \int \frac{\cos 2x - \cos 2\theta}{\cos x - \cos \theta} \ dx \) is equal to

(A) \( 2(\sin x + x \cos \theta) + C \)

(B) \( 2(\sin x - x \cos \theta) + C \)

(C) \( 2(\sin x + 2x \cos \theta) + C \)

(D) \( 2(\sin x - 2x \cos \theta) + C \)
39. \( \int \sqrt{x^2 + 2x + 5} \, dx \) is equal to
   \[
   (A) \quad \frac{1}{2} (x + 1) \sqrt{x^2 + 2x + 5} \, + C
   
   (B) \quad (x + 1) \sqrt{x^2 + 2x + 5} + 2 \log \left| x + 1 + \sqrt{x^2 + 2x + 5} \right| + C
   
   (C) \quad (x + 1) \sqrt{x^2 + 2x + 5} - 2 \log \left| x + 1 + \sqrt{x^2 + 2x + 5} \right| + C
   
   (D) \quad (x + 1) \sqrt{x^2 + 2x + 5} + \frac{1}{2} \log \left| x + 1 + \sqrt{x^2 + 2x + 5} \right| + C
   \]

40. \( \int_{0}^{\pi/2} \frac{\tan^7 x}{\cot^7 x + \tan^7 x} \, dx \) is equal to
   \[
   (A) \quad \pi \quad (B) \quad \frac{\pi}{4}
   
   (C) \quad \pi \quad (D) \quad \frac{\pi}{3}
   \]

41. \( \int_{-5}^{5} \left| x + 2 \right| \, dx \) is equal to
   \[
   (A) \quad 29 \quad (B) \quad 28
   
   (C) \quad 27 \quad (D) \quad 30
   \]

42. \( \int_{-\pi/2}^{\pi/2} \frac{dx}{e^{\sin x} + 1} \) is equal to
   \[
   (A) \quad 0 \quad (B) \quad 1
   
   (C) \quad -\frac{\pi}{2} \quad (D) \quad \frac{\pi}{2}
   \]
43. \[ \int_{0}^{\pi/2} \frac{1}{a^2 \cdot \sin^2 x + b^2 \cdot \cos^2 x} \, dx \] is equal to

(A) \( \frac{\pi a}{4b} \) \hspace{1cm} (B) \( \frac{\pi a}{2b} \)

(C) \( \frac{\pi b}{4a} \) \hspace{1cm} (D) \( \frac{\pi}{2ab} \)

44. The area of the region bounded by the curve \( y = x^2 \) and the line \( y = 16 \) is

(A) \( \frac{32}{3} \) sq. units \hspace{1cm} (B) \( \frac{256}{3} \) sq. units

(C) \( \frac{64}{3} \) sq. units \hspace{1cm} (D) \( \frac{128}{3} \) sq. units

45. Area of the region bounded by the curve \( y = \cos x \), \( x = 0 \) and \( x = \pi \) is

(A) 2 sq. units \hspace{1cm} (B) 4 sq. units

(C) 3 sq. units \hspace{1cm} (D) 1 sq. unit

46. The degree of the differential equation \[ \left[ 1 + \left( \frac{dy}{dx} \right)^2 \right]^2 = \frac{d^2 y}{dx^2} \] is

(A) 1 \hspace{1cm} (B) 2

(C) 3 \hspace{1cm} (D) 4

47. General solution of differential equation \( \frac{dy}{dx} + y = 1 \) (\( y \neq 1 \)) is

(A) \( \log \left| \frac{1}{1-y} \right| = x + C \) \hspace{1cm} (B) \( \log |1-y| = x + C \)

(C) \( \log |1+y| = x + C \) \hspace{1cm} (D) \( \log \left| \frac{1}{1-y} \right| = -x + C \)
48. The integrating factor of the differential equation \( x \cdot \frac{dy}{dx} + 2y = x^2 \) is \( x \neq 0 \)

(A) \( x^2 \)  
(B) \( \log |x| \)  
(C) \( e^{\log x} \)  
(D) \( x \)

Question Id: 48

49. If \( \vec{a} = 2\hat{i} + \lambda \hat{j} + \hat{k} \) and \( \vec{b} = \hat{i} + 2\hat{j} + 3\hat{k} \) are orthogonal, then value of \( \lambda \) is

(A) 0  
(B) 1  
(C) \( \frac{3}{2} \)  
(D) \( -\frac{5}{2} \)

Question Id: 49

50. If \( \vec{a}, \vec{b}, \\vec{c} \) are unit vectors such that \( \vec{a} + \vec{b} + \vec{c} = \vec{0} \), then the value of \( \vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a} \) is equal to

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

Question Id: 50

51. If \( \vec{a} \) & \( \vec{b} \) are unit vectors, then angle between \( \vec{a} \) and \( \vec{b} \) for \( \sqrt{3} \vec{a} - \vec{b} \) to be unit vector is

(A) 30°  
(B) 45°  
(C) 60°  
(D) 90°

Question Id: 51

52. Reflexion of the point \((\alpha, \beta, \gamma)\) in XY plane is

(A) \((\alpha, \beta, 0)\)  
(B) \((0, 0, \gamma)\)  
(C) \((-\alpha, -\beta, \gamma)\)  
(D) \((\alpha, \beta, -\gamma)\)

Question Id: 52
53. The plane $2x - 3y + 6z - 11 = 0$ makes an angle $\sin^{-1} (\alpha)$ with X-axis. The value of $\alpha$ is equal to
- (A) $\frac{\sqrt{3}}{2}$
- (B) $\frac{\sqrt{2}}{3}$
- (C) $\frac{2}{7}$
- (D) $\frac{3}{7}$

54. The distance of the point (-2, 4, -5) from the line $\frac{x + 3}{3} = \frac{y - 4}{5} = \frac{z + 8}{6}$ is
- (A) $\frac{\sqrt{37}}{10}$
- (B) $\frac{\sqrt{37}}{\sqrt{10}}$
- (C) $\frac{37}{10}$
- (D) $\frac{37}{\sqrt{10}}$

55. A box has 100 pens of which 10 are defective. The probability that out of a sample of 5 pens drawn one by one with replacement and atmost one is defective is
- (A) $\frac{9}{10}$
- (B) $\frac{1}{2} \left( \frac{9}{10} \right)^4$
- (C) $\left( \frac{9}{10} \right)^5 + \frac{1}{2} \left( \frac{9}{10} \right)^4$
- (D) $\frac{1}{2} \left( \frac{9}{10} \right)^5$

56. Two events A and B will be independent if
- (A) A and B are mutually exclusive
- (B) $P(A' \cap B') = (1 - P(A)) (1 - P(B))$
- (C) $P(A) = P(B)$
- (D) $P(A) + P(B) = 1$
57. The probability distribution of X is

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<tr>
<th>X</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<tr>
<td>P(X)</td>
<td>0.3</td>
<td>k</td>
<td>2k</td>
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The value of k is
(A) 0.14  (B) 0.3  (C) 0.7  (D) 1

58. The shaded region in the figure is the solution set of the inequations

(A) \(5x + 4y \geq 20, x \leq 6, y \geq 3, x \geq 0, y \geq 0\)
(B) \(5x + 4y \leq 20, x \leq 6, y \leq 3, x \geq 0, y \geq 0\)
(C) \(5x + 4y \geq 20, x \leq 6, y \geq 3, x \geq 0, y \geq 0\)
(D) \(5x + 4y \geq 20, x \geq 6, y \leq 3, x \geq 0, y \geq 0\)

59. If an LPP admits optimal solution at two consecutive vertices of a feasible region, then
(A) the required optimal solution is at the midpoint of the line joining two points.
(B) the optimal solution occurs at every point on the line joining these two points.
(C) the LPP under consideration is not solvable.
(D) the LPP under consideration must be reconstructed.

60. \(\int_{0.2}^{3.5} \lceil x \rceil \text{ dx }\) is equal to
(A) 4  (B) 4.5  (C) 3.5  (D) 3
## Table

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### Notes:

1. The practical exam will be conducted on [28th April 2017](#). Practical exams will be conducted at the [Dharwad](#) location on [21st May 2017](#) and [15th June 2017](#) respectively.

2. The examination will start at 08:30 AM and end at 11:30 AM.

3. Candidates will have 3 hours to complete the exam.

4. The practical exam will be conducted in [Dharwad](#) on [28th April 2017](#). Practical exams will be conducted at the [Dharwad](#) location on [21st May 2017](#) and [15th June 2017](#) respectively.

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