

CLASS TEST

S.No. : 01 SK1_CS_W+Y_170819

Engineering Mathematics



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COMPUTER SCIENCE & IT Engineering Mathematics

Duration : 1:00 hr.

Maximum Marks : 50

Read the following instructions carefully

1. This question paper contains **30** objective questions. **Q.1-10** carry one mark each and **Q.11-30** carry two marks each.
2. Answer all the questions.
3. Questions must be answered on Objective Response Sheet (**ORS**) by darkening the appropriate bubble (marked **A, B, C, D**) using HB pencil against the question number. Each question has only one correct answer. In case you wish to change an answer, erase the old answer completely using a good soft eraser.
4. There will be **NEGATIVE** marking. For each wrong answer **1/3rd** of the full marks of the question will be deducted. More than one answer marked against a question will be deemed as an incorrect response and will be negatively marked.
5. Write your name & Roll No. at the specified locations on the right half of the **ORS**.
6. No charts or tables will be provided in the examination hall.
7. Choose the **Closest** numerical answer among the choices given.
8. If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that questions.
9. If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

Q.No. 1 to Q.No. 10 carry 1 mark each

- Q.1** Identify the correct statement from the following
- Commutative property not holds for addition of matrices
 - Associative property not holds for addition of matrices
 - Commutative property not holds for multiplication of matrices
 - None of the above

- Q.2** Which one of the following random variable is discrete?
- A person's exact weight
 - Number of questions attempted in a test
 - Both (a) and (b)
 - Neither (a) nor (b)

- Q.3** If $A = B + C$ such that B is a symmetric matrix and C is a skew - symmetric matrix. then B is given by
- $A + A'$
 - $A - A'$
 - $1/2(A + A')$
 - $1/2(A - A')$

- Q.4** At the point $x = 1$, the function

$$f(x) = \begin{cases} x^3 - 1; & 1 < x < \infty \\ x - 1; & -\infty < x \leq 1 \end{cases} \text{ is}$$

- continuous and differentiable
- continuous and not differentiable
- discontinuous and differentiable
- discontinuous and not differentiable

- Q.5** Let matrix $[A]_{m \times n}$ has rank a and matrix $[B]_{n \times p}$ has rank b . Then matrix $[AB]$ may have rank
- $\leq \max(a, b)$
 - n
 - $a + b$
 - $\leq \min(a, b)$

- Q.6** Let the eigen values of matrix $[A]_{2 \times 2}$ are α and β . The eigen values for $(A + 5I)^{-1}$ are

- $(\alpha + 5), (\beta + 5)$
- $\frac{1}{\alpha + 5}, \frac{1}{\beta + 5}$
- $\frac{1}{\alpha} + 5, \frac{1}{\beta} + 5$
- can't be determined

- Q.7** Let the matrix $A = \begin{bmatrix} 4 & 1 \\ 1 & 4 \end{bmatrix}$. What is the product of eigen values of A^T ?
- 9
 - 9
 - 15
 - 15

- Q.8** If matrix A is skew-symmetric, then $A \cdot A$ is
- Skew-symmetry matrix
 - Symmetric matrix
 - Diagonal matrix
 - Nothing can be said

- Q.9** The manufacturer knows that the TV's he make contain on an average 1% defective. He packs them in boxes of 100. What is the probability the box picked at random will contain 2 or more faulty TV's _____?

- $\frac{e-1}{e}$
- $\frac{e-2}{e}$
- 0
- None of these

- Q.10** Suppose we have 2 bags. Bag 1 contains 3 red and 7 green balls. Bag 2 contains 4 red and 8 green balls. A person tosses a coin and if it is heads goes to bag 1 and draws a ball. If it is tails, he goes to bag 2 and draws a ball. Given that the ball draw is red, then what is probability that it came from bag 1?
- 0.371
 - 0.317
 - 0.470
 - 0.271

Q.No. 11 to Q.No. 30 carry 2 marks each

- Q.11** The polynomial, $P(x) = x^5 + x + 2$, has
- All real roots
 - 3 real and 2 complex roots
 - 1 real and 4 complex roots
 - None of these

- Q.12** The function, $f(x) = 2x^3 - 3x^2 - 36x + 10$, has a local maximum value at 'x' equals to
- 2
 - 1
 - 3
 - 4

- Q.13** The value of $\lim_{x \rightarrow \infty} \left(\frac{x+6}{x+1} \right)^{x+4}$ is

- e^{10}
- e^6
- e^5
- e^2

- 14.** The degree of $y + x \frac{dy}{dx} = \sqrt{1 + \left(\frac{dy}{dx} \right)^3}$ is
- 1
 - 2
 - 3
 - None of these

- Q.15** If $[A] = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$ such that $A^2 = B$ then α is
 (a) 4
 (b) 0
 (c) 1
 (d) Unique value is not possible

- Q.16** A Random variable has the probability density function as $f(x) = \begin{cases} 2e^{-2x} & \text{for } x > 0 \\ 0 & \text{for } x \leq 0 \end{cases}$.

What is the probability if f takes a value between 1 and 3?

- (a) $e^2 - e^6$ (b) $e^2 + e^6$
 (c) $e^{-2} - e^{-6}$ (d) $e^{-2} + e^{-6}$

- Q.17** If $f(a) = 2$, $f'(a) = 1$, $g(a) = -1$, $g'(a) = 2$, then

$\lim_{x \rightarrow a} \frac{g(x)f(a) - g(a)f(x)}{x - a}$ is _____.

- (a) 5 (b) 15
 (c) 10 (d) -1

- Q.18** If mean and standard deviation of a binomial distribution are 3 and $\frac{3}{2}$ respectively, then binomial distribution is $(q + p)^n$. The value of n is _____.

- (a) 8 (b) 12
 (c) 16 (d) 20

- Q.19** Suppose X and Y are random variables such that $E(X) = 1$, $\text{Var}(X) = 1$, $E(Y) = 2$, $\text{Var}(Y) = 2$, $\text{Cov}(X, Y) = 1$

By using above values the following expressions are evaluated

- (i) $E(X + 2Y) = p$ (ii) $E(XY) = q$
 (iii) $\text{Var}(X - 2Y + 1) = r$

The value of $pq + r$ is _____.

- (a) 10 (b) 20
 (c) 25 (d) 35

- Q.20** Two cards are drawn successively, with replacement from a pack of 52 cards. The probability of drawing two aces is:

- (a) $\frac{1}{13} \times \frac{1}{13}$ (b) $\frac{1}{13} \times \frac{1}{17}$
 (c) $\frac{1}{25} \times \frac{1}{51}$ (d) $\frac{1}{3} \times \frac{1}{51}$

- Q.21** Which of the following matrices is not invertible?

(a) $A_1 = \begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix}$ (b) $A_2 = \begin{bmatrix} 1 & 0 & 4 \\ -1 & 1 & -1 \\ -1 & 0 & 3 \end{bmatrix}$

(c) $A_3 = \begin{bmatrix} 1 & 3 & 1 \\ 2 & 5 & 2 \\ 4 & 7 & 4 \end{bmatrix}$ (d) $A_4 = \begin{bmatrix} 2 & 3 & 1 \\ 3 & 0 & 1 \\ 3 & 1 & 2 \end{bmatrix}$

- Q.22** The values of a and b for which the following system has no solutions are respectively

$$ax + y + 2z = 0$$

$$x + 2y + z = b$$

$$2x + y + az = 0$$

- (a) $a = -1, b = 0$ (b) $a = 2, b = 0$
 (c) $a = -1, b \neq 0$ (d) $a = 2, b \neq 0$

- Q.23** The value of $\int_0^{2\pi} [|\sin x| + |\cos x|] dx$ is equal to

- (a) $\frac{\pi}{2}$ (b) π
 (c) $\frac{3\pi}{2}$ (d) 2π

- Q.24** Suppose A and B are two independent events with probabilities $P(A) \neq 0$ and $P(B) \neq 0$. Let \bar{A} and \bar{B} be their complements. Which one of the following statements is FALSE?

- (a) $P(A \cap B) = P(A)P(B)$
 (b) $P(A/B) = P(A)$
 (c) $P(A \cup B) = P(A) + P(B)$
 (d) $P(\bar{A} \cap \bar{B}) = P(\bar{A})P(\bar{B})$

- Q.25** Which of the following is true?

- (a) The value of determinant remains unchanged, if the rows are inter changed into column or vice versa.
 (b) A skew symmetric matrix of even order is perfect square.
 (c) Determinant of odd order skew symmetric matrix is zero.
 (d) All of the above

- Q.26** A matrix $P_{3 \times 3}$ has three eigen values $-1, 1/2, 3$. What will be the eigen values of $P^2 + 2P + I$ [Where I is identity matrix (3×3 order)]

- (a) 0, 16, 9/4 (b) 1, 1/4, 9
 (c) 2, 9/2, 4 (d) 2, 3/2, -2

Q.27 The standard deviation of a uniformly distributed random variable between 1 and 3 is

(a) $\frac{1}{\sqrt{12}}$ (b) $\frac{1}{\sqrt{6}}$

(c) $\frac{2}{\sqrt{6}}$ (d) $\frac{1}{\sqrt{3}}$

Q.28 The given equations are solved by using LU -decomposition method.

$$x_1 + 3x_2 - 8x_3 = 4$$

$$x_1 + 4x_2 + 3x_3 = -2$$

$$x_1 + 3x_2 + 4x_3 = 1$$

What is the upper triangle matrix value?

(a) $\begin{bmatrix} 1 & 3 & 8 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 11 & 8 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 3 & -8 \\ 0 & 1 & 11 \\ 0 & 0 & 1 \end{bmatrix}$ (d) None of above

Q.29 A six-faced die is biased i.e. when it thrown, their it is twice as likely to show an even number than an odd number. If it is thrown twice, then the probability of sum of two numbers thrown is odd is _____ . (upto 2 decimal places)

(a) 0.44

(b) 0.79

(c) 0.88

(d) 0.97

Q.30 Consider the following linear equations of system :

$$x + y + z = 6$$

$$x + 2y + 5z = 10$$

$$2x + 3y + \lambda z = \mu$$

Which of the following is correct above system ?

(a) System has unique solution for $\lambda \neq 6$ and $\mu \neq 16$

(b) System has no solution for $\lambda = 6$ and $\mu \neq 16$

(c) System has infinite solution for $\lambda = 6$ and $\mu = 16$

(d) All of the above

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