

Model Question Paper

Undergraduate Programme - Mathematics

Questions: 40

Time : 40 Minutes

Max. Marks 40 x 1 : 40

SHADE the correct Response viz., A, B, C, D or E in the RESPONSE SHEET. **Each Question carry ONE mark.**

SAMPLE QUESTIONS

Question 1: Which one of the following statements is FALSE ?

- (A) In the expansion of $(a + b)^n$, the r^{th} term is $\binom{n}{r} a^{n-r} b^r$
- (B) If A and B are square matrices, then $\det(AB) = \det(A) \cdot \det(B)$
- (C) In a geometric series, the ratio of any two successive terms is constant
- (D) The equation $x^4 + x^2 + 1$ has two real quadratic factors
- (E) The inverse of $a + bi$ is $\frac{a}{a^2 + b^2} + \frac{-b}{a^2 + b^2}i$

Question 2: What are the roots of the equation $12x^3 + 16x^2 - 3x = 0$?

- (A) 0 only
- (B) $-3/2$ and $1/6$ only
- (C) $3/2$ and $-1/6$ only
- (D) 0, $3/2$ and $-1/6$
- (E) 0, $-3/2$ and $1/6$

Question 3: Which one of the following is TRUE ?

- (A) $\sin 150^\circ = -\sin 30^\circ$
- (B) $\sin 30^\circ = \frac{2 \tan 15^\circ}{1 + \tan^2 15^\circ}$
- (C) $\sin 15i = i \cosh 15$
- (D) $a^2 = b^2 + c^2 - 2bc \sin A$
- (E) $\cos 75^\circ = \sin 45^\circ \cos 30^\circ - \sin 30^\circ \cos 45^\circ$

Question 4: What are the values of x in $[0, 2\pi]$ that satisfy the trigonometric equation $\sin x + \cos x = 0$?

- (A) $5\pi/4$ and $7\pi/4$
- (B) $3\pi/4$ and $5\pi/4$
- (C) $3\pi/4$ and $7\pi/4$
- (D) $\pi/4$ and $3\pi/4$
- (E) $\pi/4$ and $5\pi/4$

Question 5: Which one of the following expressions is meaningful ?

- (A) $\vec{a} \cdot \vec{b} \cdot \vec{c}$
- (B) $\vec{a} \times \vec{b} \times \vec{c}$
- (C) $\vec{a} \vec{b} \cdot c$
- (D) $a\vec{b} \times \vec{c}$
- (E) $\vec{a} \cdot b \times \vec{c}$

Question 6: Which one of the following is FALSE ?

- (A) $\vec{a} + \vec{b} = \vec{b} + \vec{a}$ (B) $\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{a}$ (C) $\vec{a} \times \vec{b} = \vec{b} \times \vec{a}$
 (D) $\vec{a} + \vec{0} = \vec{a}$ (E) $\vec{a} \times \vec{0} = \vec{0}$

Question 7: Given the marks - 20, 10, 0, 12, 13, 10, 5, 10, 0, 20 - obtained by students in a test for 20 marks, which one of the following is FALSE ?

- (A) mean marks is 10 (B) median marks is 10
 (C) modal marks is 10 (D) range of marks is 10
 (E) total number of observations is 10

Question 8: Two unbiased dice are thrown. What is the probability that the sum of numbers on the dice is 7 ?

- (A) $7/36$ (B) $1/6$ (C) $5/36$ (D) $2/9$ (E) $1/12$

Question 9: How many 3-digit odd numbers can be formed using the digits 0, 1, 2, 3, 6, 9 ?

- (A) 60 (B) 90 (C) 216 (D) 75 (E) 180

Question 10: What is the slope and the x - intercept of the straight line $2x + 3y - 4 = 0$, respectively ?

- (A) $-2/3$ and $4/3$ (B) $2/3$ and 2
 (C) $2/3$ and $-4/3$ (D) $-2/3$ and 2
 (E) $-2/3$ and $4/3$

Question 11: What is the equation of the ellipse with one focus at $(\frac{1}{\sqrt{2}}, 0)$ and one vertex at $(0, -1)$?

- (A) $2x^2 + 3y^2 = 3$ (B) $x^2 + 3y^2 = 3$
 (C) $2x^2 + 3y^2 = 1$ (D) $2x^2 + 3y^2 = 6$
 (E) $2x^2 + y^2 = 3$

Question 12: Classify $f : \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = x^2$.

- (A) not a function (B) both one-to-one and onto
 (C) one-to-one but not onto (D) not one-to-one but onto
 (E) neither one-to-one and onto

Question 13: What is the derivative of $2x^3 + 6x^2 + 5$ with respect to $x^2 + 4x - 1$?

- (A) $3x$ (B) $6x^2 + 12x$ (C) $2x$ (D) $2x + 4$ (E) $3x + 1$

Question 14: If $\int x \cdot u(x) dx = \log \log x$, then what is $u(x)$:

- (A) $\frac{1}{x \log x}$ (B) $\frac{1}{x^2 \log x}$ (C) $\frac{1}{x}$ (D) $\frac{1}{x^2}$ (E) $\log x$

Question 15: Let $f: R \rightarrow R$ be defined by $f(x) = \sqrt{x^2 - 4}$, then the largest domain in which f is continuous is _____

(A) R (B) $[2, \infty)$ (C) $(-\infty, -2]$ (D) $(-\infty, -2] \cup [2, \infty)$ (E) $[-2, 2]$

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