

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY
First Semester of B. Pharm (New) Examination December 2015
MA131.1 Basic Mathematics

Date: 18/12/2015, Friday Time: 10:00 a.m. to 01:00 p.m. Maximum Marks: 80

Instructions:

1. There are three sections in this question paper.
2. SECTION I comprises of Question 1. Total marks for Section 1 are 20. There are 20 sub-questions (MCQ type). Answers to SECTION I are to be given in Answer Sheet for MCQ type questions provided to you. Maximum time allotted for SECTION I is 30 minutes. Answers to SECTION I must be written during the first 30 minutes of the examination.
3. Answers to SECTION II and SECTION III are to be provided in separate Main Answer Books provided to you.
4. Figures to right indicate marks.
5. Draw neat sketches wherever necessary.
6. Use of scientific non-programable calculator is allowed.

SECTION I

Q.1. Darken the circle of the correct/most suitable choice. [20]

1. The total number of subsets of the set $\{x, y, z, w, k\}$ is

- (A) 32 (B) 25 (C) 10 (D) 5

2. Which of the following relation is not true?

- (A) $\mathbb{N} \subset \mathbb{R}$ (B) $\mathbb{Q} \subset \mathbb{R}$ (C) $\mathbb{Q} \subset \mathbb{N}$ (D) $\mathbb{N} \subset \mathbb{Z}$

3. The range of relation $R = \{(1, 3), (2, 4), (3, 5), (2, 8), (1, 6)\}$ is

- (A) $\text{ran}(R) = \{1, 2, 3, 4, 5, 6, 8\}$ (C) $\text{ran}(R) = \{1, 2, 3\}$
 (B) $\text{ran}(R) = \{3, 4, 5, 6, 8\}$ (D) $\text{ran}(R) = \{1, 2\}$

4. Which of the following function is algebraic?

- (A) $\sin x$ (B) $x^2 + x - 7$ (C) $\sin^{-1} x$ (D) 5^x

5. $\lim_{x \rightarrow 0^-} \frac{1}{x^3} = \dots$

- (A) 0 (B) 1 (C) ∞ (D) $-\infty$

6. If $\lim_{x \rightarrow 2^+} f(x) = 3$, $\lim_{x \rightarrow 2^-} f(x) = 3$ and $f(2) = 3$, then

- (A) $\lim_{x \rightarrow 2} f(x)$ is not exist (C) $f(x)$ is not continuous at $x = 2$
 (B) $f(x)$ is continuous at $x = 2$ (D) None of the above

7. what is $\frac{d}{dx}(\sin 5x)$?

- (A) $5 \cos 5x$ (B) $5 \cos x$ (C) $5 \sin x$ (D) $\cos 5x$

8. what is $\frac{d}{dx}(100)$?

- (A) 100 (B) 10 (C) x (D) 0

9. $\int \frac{1}{x} dx = \dots$

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

10. $\int_k^k f(x) dx = \dots$

- (A) 0 (B) $2kf(x)$ (C) $\frac{f(x)}{2k}$ (D) $k^2 f(x)$

11. Which of the following is true?

- (A) $\int_a^b f(x) dx - \int_b^a f(x) dx = 0$ (C) $\int_a^b f(x) dx - 2 \int_b^a f(x) dx = 0$
(B) $\int_a^b f(x) dx + \int_b^a f(x) dx = 0$ (D) $2 \int_a^b f(x) dx + \int_b^a f(x) dx = 0$

12. For a matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, which of the following is not true?

- (A) A is scalar matrix (C) A is symmetric matrix
(B) A is identity matrix (D) A is skew-symmetric matrix

13. A matrix $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ is

- (A) Lower triangular matrix (C) Scalar matrix
(B) Upper triangular matrix (D) Identity matrix

14. What is the value of $\begin{vmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{vmatrix}$?

- (A) $\sin 2\theta$ (B) $\cos 2\theta$ (C) 1 (D) 0

15. If $4 + 7i$ is one of the root of a quadratic equation, then other root of the equation is
- (A) $7 + 4i$ (B) 4 and 7 (C) $7 - 4i$ (D) $4 - 7i$
16. If discriminant (Δ) of quadratic is 0, then the roots of quadratic equation are
- (A) real and equal (C) imaginary (complex)
 (B) real and distinct (D) none of above
17. The arithmetic mean of first 10 natural numbers is
- (A) 6 (B) 6.5 (C) 5.5 (D) 5
18. The geometric mean of the numbers 2, 4, 27 is
- (A) 6 (B) 11 (C) 4.7 (D) 22.3
19. The mode of data 1, 2, 3, 4, 3, 5, 9 is
- (A) 8 (B) 9 (C) 3 (D) 3.8571
20. Range of data 120, 130, 100, 85, 100 is
- (A) 20 (B) 45 (C) 40 (D) 35

SECTION II

Q.2. Attempt any Four of the following. [20]

A Prove that a function $f : \mathbb{R} \rightarrow \mathbb{R}$ define by $f(x) = 3x - 7$ is one-one and onto. [05]

B (a) Evaluate the limit $\lim_{x \rightarrow \infty} \frac{x^4 + 8x^3 - x^2 + 9}{x^4 - 2x + 11}$ [03]

(b) Prove or disprove: A function x^2 is continues at $x = 5$. [02]

C (a) Evaluate $\int \frac{4x-3}{\sqrt{2x^2-3x+13}} dx$ [03]

(b) Evaluate $\int (1 + 2x - 3 \cos x + e^x) dx$ [02]

D If $A = \begin{bmatrix} 1 & 3 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 5 & 2 \end{bmatrix}$ then verify $(AB)^T = B^T A^T$, [05]

where A^T indicate transpose of matrix A .

E 1. Solve the equation $x^2 + 2x + 10 = 0$. [03]

2. Define: root of equation. [02]

what is root of equation $x + \sqrt{\frac{3}{2}} = 0$?

F Find the standard deviation of the following distribution: [05]

Age	20-25	25-30	30-35	35-40	40-45	45-50
No. of Persons	170	110	80	45	40	35

SECTION III

Q.3. Attempt any **Four** of the following. [20]

A 1. Define: null set, power set, domain of relation. [03]

2. If $A = \{1, 2, 3\}$ and $B = \{2, 4\}$, then find $A \times B$. [02]

B Let $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$. Then [05]
verify

(i) $(A \cap B)' = A' \cup B'$

(ii) $(A \cup B)' = A' \cap B'$

C 1. Find $\frac{df}{dx}$ if $f(x) = 5^x \cot x$. [03]

2. Find $\frac{dy}{dx}$ if $\sin(xy) = x + y$. [02]

D A particle is moving along a curve $f(t) = 2t^3 - t$, where t is time, at what [05]
time the velocity of particle will be $5 \frac{km}{hour}$? At what time an acceleration of
particle will be $24 \frac{km}{hour^2}$?

E Evaluate $\int_0^1 x^2 e^x dx$. [05]

F 1. Evaluate $\int (2x - 1)^6 dx$ [03]

2. Find $\int_0^{\frac{\pi}{2}} (\sin x + \cos x) dx$ [02]

Q.4. Attempt any **Four** of the following. [20]

A Find the rank of [05]

$$\begin{bmatrix} 2 & -1 & 3 \\ 4 & -2 & 6 \\ -6 & 3 & -9 \end{bmatrix}$$

B Solve the following simultaneous equations using Cramer's rule. [05]

$$x + y + z = 4$$

$$2x - 3y + 4z = 33$$

$$3x - 2y - 2z = 2$$

C Following data show particle size distribution of liquid Paraffin Emulsion. [05]
Find mode for following data.

Particle size(microns)	1-30	31-60	61-90	91-120	121-150	151-180
Frequency	8	13	25	29	18	7

D Compute the median for the following frequency distribution. [05]

size	below 10	10-12	12-14	14-16	16-18	18-20
Demand	3	15	27	20	3	2

E Compute the arithmetic mean for the following data: [05]

Class Interval	0-30	30-60	60-90	90-120	120-150	150-180
Frequency	8	13	22	27	18	7

F 1. Solve the equation $x^2 + 18x + 81 = 0$. [03]

2. Find the root of $x(x - 10)(x - 13) = 0$. [02]
