

PRACTICE SET

End Semester Examination, Spring- 2026

Program: Diploma (Mining & CSE)

Semester: II

Subject: Basic Mathematics II

Subject Code: 8DBSC105 & 3DBSC105

Unit - I

Marks – 10

- Let A and B be the events such that $P(A) = 1/3$, $P(B) = 1/4$ and $P(A \cup B) = 1/5$. Find
(i) $P(A/B)$ (ii) $P(B/A)$ (iii) $P(A \cup B)$ (iv) $P(\bar{B}/\bar{A})$
- A can solve 90% of the problems given in a book, and B can solve 70%. What is the probability that at least one of them will solve a problem selected at random from the book?

3. Find mean deviation about mean of given frequency Distribution

Marks obtained: 10 – 20 20 – 30 30 – 40 40 – 50 50 – 60 60 – 70

No. of students: 8 6 12 5 3 7

4. Calculate the mean deviation about the median for given frequency distribution:

Height (in cm) : 95 – 105 105 – 115 115 – 125 125 – 135 135 – 145 145 - 155

No. of boys : 9 13 30 25 13 10.

Marks: 20

5. Evaluate mean, variance and standard deviation for the given frequency distribution

Class	92	93	97	98	102	104	109
Frequency	3	2	3	2	6	3	3

6. Evaluate mean, variance and standard deviation for the given frequency distribution:

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

Unit – II

Marks – 10

7. Separate $\frac{3+i}{2-i}$ into real and imaginary parts and hence find its modulus.
8. Use DeMoivre's theorem to find $(1 - i)^8$.
9. If $(x + iy)^3 = u + iv$ then show that $\left(\frac{u}{x} + \frac{v}{y}\right) = 4(x^2 - y^2)$
- 10.

Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$.

11.

If $z_1 = 2 + i, z_2 = 2 - 3i, z_3 = 4 + 5i$, evaluate $\operatorname{Re}\left(\frac{z_1 \cdot z_2}{z_3}\right)$

12.

If $\frac{(1+i)^2}{2-i} = x + iy$, then find the value of $x + y$.

Marks: 20

13. (i) If Z is a complex number such that $|z|=1$, prove that $\left(\frac{z-1}{z+1}\right)$ where $z \neq -1$, is purely imaginary except when $z=1$.

(ii) Evaluate $\sqrt{-5 + 12i}$

14. (i) Convert the complex number $\frac{-16}{1+i\sqrt{3}}$ into the polar form.

(ii) Prove that $(2-\omega)(2-\omega^2)(2-\omega^{10})(2-\omega^{11}) = 49$

Unit -III

Marks – 10

15. 29. Express the matrix $\begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$ as the sum of a symmetric and a skew-symmetric matrix.

16. If $f(x) = x^2 + 5x + 1$ and $A = \begin{bmatrix} 4 & 1 \\ -1 & 2 \end{bmatrix}$, find $f(A)$.

17. Find inverse of the matrix $\begin{bmatrix} 3 & 5 \\ 7 & -9 \end{bmatrix}$

18. If $A = \begin{bmatrix} 2 & -1 & 3 \\ -4 & 5 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 4 & -2 \\ 1 & 5 \end{bmatrix}$ then find AB and BA .

19.

If $A = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$, find A^{-1} . Using A^{-1} solve the system of equations
 $x - 2y = 10$, $2x - y - z = 8$, $-2y + z = 7$.

20. Solve the equation by matrix method

$$\begin{aligned} 3x + 2y - 2z &= 3 \\ x + 2y + 3z &= 6 \\ 2x - y + z &= 2 \end{aligned}$$

Marks – 20

21. Verify that for $A = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & -2 \\ 1 & 0 & 3 \end{bmatrix}$, $A \cdot \text{adj.}(A) = |A| I$.

22. If $A = \begin{bmatrix} 1 & 2 & 5 \\ 1 & -1 & -1 \\ 2 & 3 & -1 \end{bmatrix}$; find A^{-1} .

Unit IV

Marks – 10

23. Find the equations of a line which passes through the point $(-1, 3, -2)$ and perpendicular to each of the lines $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and $\frac{x+2}{-3} = \frac{y-1}{2} = \frac{z+1}{5}$.

24. Find the angle between the lines $\frac{x+1}{1} = \frac{y-4}{1} = \frac{z-5}{2}$ and $\frac{x+3}{3} = \frac{y-2}{5} = \frac{z+5}{4}$.

25. Show that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-4}{5} = \frac{y-1}{2} = \frac{z}{1}$ intersect each other. Find their point of intersection.

26. Find the direction cosines of the vector joining the points A $(1, 2, -3)$ and B $(-1, -2, 1)$ directed from A to B.

Marks – 20

26. Find the length and the equation of the line of shortest distance between the lines given by

$$\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1} \text{ and } \frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}.$$

27. Find the image of the point $(0, 2, 3)$ in the line $\frac{x+3}{5} = \frac{y-1}{2} = \frac{z+4}{3}$.

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Disclaimer: - This is a Practice set. The Question in End term examination will differ from the Practice set. This Practice set is meant for practice only.

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