DEPT: **BASIC ENGG**   **YEAR/SEMESTER**: **I /I**

SUB.NAME: **ENGG MATHEMATICS-I**

Each question carries 1(one) mark in PART-A and 6(SIX) marks in PART-B

UNIT-I-ALGEBRA

PART -A

1. Define minor of element.
2. Define co-factor of on element.
3. Find the **minor of 3** in $\begin{vmatrix} 2 & -3 & 4 \\ 1 & 2 & 3 \\ 0 & 1 & 0 \end{vmatrix}$
4. Find the **co-factor of -1** in $\begin{vmatrix} 5 & 3 & 1 \\ 2 & 8 & -1 \\ 7 & 4 & 6 \end{vmatrix}$
5. Find the **value of m** when $\begin{vmatrix} m & 2 & 1 \\ 3 & 4 & 2 \\ -7 & -2 & 1 \end{vmatrix} = 0$
6. Solve : $\begin{vmatrix} x & x \\ 3 & 2x \end{vmatrix} = 0$
7. Solve : $\begin{vmatrix} x+5 & 4 \\ 0 & x-5 \end{vmatrix} = 0$
8. Solve : $\begin{vmatrix} x & 9 \\ 4 & x \end{vmatrix} + 20 = 0$
9. Find the value of x when $\begin{vmatrix} x & 2x & 5 \\ x & 3x & 5 \\ 1 & x & 5 \end{vmatrix} = 0$
10. With out expanding , find the value of $\begin{vmatrix} 6 & 3 & 2 \\ 1 & 2 & 4 \\ 3 & 6 & 12 \end{vmatrix}$
11. Evaluate : $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$
12. Evaluate : $\begin{vmatrix} \cos\emptyset & \sin\emptyset \\ -\sin\emptyset & \cos\emptyset \end{vmatrix}$
13. If A= $\begin{pmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{pmatrix}$ and B= $\begin{pmatrix} 7 & 6 & 5 \\ 1 & 4 & 5 \end{pmatrix}$, evaluate 2A+3B.
14. If A= $\begin{pmatrix} 1 & 3 \\ 3 & 4 \end{pmatrix}$ and B= $\begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$ find A-B.
15. If A= $\begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 1 & 1 & 4 \end{pmatrix}$ find A+A^T.

16. If $A= \begin{pmatrix} 1 & 8 \\ 4 & 3 \end{pmatrix}$ and $B= \begin{pmatrix} 1 & 3 \\ 7 & 4 \end{pmatrix}$ find AB.

17. Show that $A= \begin{pmatrix} 3 & 6 \\ 1 & 2 \end{pmatrix}$ is a **singular matrix.**

18. Find the **adjoint of** $\begin{pmatrix} -3 & 4 \\ 2 & 7 \end{pmatrix}$

19. Find the **inverse of** $\begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix}$

20. Define the following: unit matrix, transpose of a matrix, symmetric matrix, skew symmetric matrix, scalar matrix.

PART-B

1. Solve the equations using **gramers rule**, $3x-y+2z=8$, $x+y+z=2, 2x+y-z=-1$.

2. (i) Solve the equations using **gramers rule**, $x-y=1, 2x-3y+1=0$.(ii)prove that
$$\begin{vmatrix} 2a+b & a & b \\ 2b+c & b & c \\ 2c+a & c & a \end{vmatrix}=0$$

3. prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+a & 1 \\ 1 & 1 & 1+a \end{vmatrix}= a^2(a+3)$.

4. prove that $\begin{vmatrix} a+b+c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix}= 2(a+b+c)^3$.

5. Show that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix}= abc(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c})$.

6. If $A= \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$ show that $A^2-4A-5I=0$, where I is unitmatrix of order 3.

7. Find the **inverse** of the matrix $\begin{pmatrix} 1 & 1 & -1 \\ 2 & 1 & 0 \\ -1 & 2 & 3 \end{pmatrix}$.

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UNIT-II-BINOMIAL THEOREM

PART-A

1. Find **the value of 10C$_4$.**
2. State binomial **theorem for positive integral index**.
3. How many middle terms are there in the expansion of $(2x - 5/y)^{17}$.
4. Find the general term in the expansion of $(x+1/x)^{10}$.
5. Find the 5th term of $(x^2 +1/x)^{10}$.
6. State binomial **theorem for a rational index.**
7. Expand $(1-2x)^{-3}$ using binomial theorem.
8. Prove that $\dfrac{1}{1-x} = 1+x+x^2+....+$.
9. Resolve $\dfrac{1}{(x+1)(x+2)^2}$ into patial fractions without finding the constants.

PART-B

1. Find the **general term** in the expansion of $\left(x^2 - \dfrac{2}{x}\right)^9$.
2. Find the **7th term** of $\left(x^2 + \dfrac{1}{x}\right)^{10}$
3. Find the **middle terms** are there in the expansion of $\left(4x^3 + \dfrac{1}{x^2}\right)^{11}$.
4. Find the term **independent of 'x'** in the expansion of $\left(\sqrt{x} - \dfrac{1}{x^2}\right)^{20}$.
5. Find the **coefficient of x^{32}** in the expansion of $\left(x^4 - \dfrac{1}{x^3}\right)^{15}$.
6. Resolve $\dfrac{1}{(x-1)(x+2)^2}$ into patial fractions.
7. Resolve $\dfrac{7x-4}{(x+2)(x-1)^2}$ into patial fractions.
8. Resolve $\dfrac{x-4}{x^2-3x+2}$ into patial fractions.

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UNIT-III-STRAIGHT LINES

PART-A

1. Find the **length of the perpendicular** from (3,2) to the straight line $3x+2y+1=0$
2. Find the points on y-axis whose perpendicular from the straight line in $4x-3y-12=0$ is 3.
3. Find the **perpendicular distance** between the parallel lines $2x+3y-6=0$ and $2x+3y+7=0$.
4. Determine the angle between the lines $3x+6y=8$ and $2x+y=5$.
5. Find the value of 'a', if the lines $3x+4y-2=0$ and $ax-2y+1=0$ are **parallel**.
6. Find the value of 'p' so that the straight lines $x-2y+7=0$ and $3x=py+6$ are **perpendicular**.
7. Find the equation to the line through the point (2,3) and perpendicular to $4x-3y-10=0$.
8. Write down the condition that the pair of straight lines $\mathbf{ax^2+2hxy+by^2=0}$ **is to be perpendicular.**
9. Show that the two lines represented by $4x^2+4xy+y^2=0$ are parallel to each other.
10. Find the value of 'p' if the two lines represented by $4x^2-12xy+9y^2=0$ are **parallel** to each other.
11. Write down the condition that the pair of straight lines $\mathbf{ax^2+2hxy+by^2=0}$ **is to be parallel**.
12. Show that the two lines represented by $2x^2-3xy-2y^2=0$ are **perpendicular** to each other.
13. Find the value of 'p' if the two lines represented by $3x^2+4xy+py^2=0$ are perpendicular to each other.
14. Find the **separate equation** of the st.lines $6x^2+xy-y^2=0$.
15. Find the **combined equation** of the lines whose separate equations are $2x+4y-2=0$ and $3x+y+3=0$.

PART-B

1. Find the equation of the straight line through the point of intersection of the lines $3x+y=5$, $x+y=3$ and perpendicular the line $x+5y=7$.
2. Find the **orthocenter of the triangle** whose vertices are (5,-2) ,(1,2) and (1,4).
3. Find the **angle between** the pair of lines given by $4x^2+9xy-9y^2=0$.find also the separate equations.
4. If the slope of one of the lines $ax^2+2hxy+by^2=0$ is **twice that of the other**, show that $\mathbf{8h^2=9ab}$.
5. Show that the equation $4x^2+4xy+y^2-6x-3y-4=0$ represent a pair of parallel st.lines and find **the distance between** them.
6. If the equation $ax^2+3xy-2y^2-5x+5y+c=0$ represents two st.lines perpendicular to each other, find 'a' and 'c'.

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