I..CHOOSE THE CORRECT ANSWERS OF THE FOLLOWING:

1.
2 MARKS

One of the following is group	
A	(Z, +)
B	(N, -)
C	(N, .)
D	(N, /)

2.
2 MARKS

One of the following is ring	
A	(C, +, .)
B	(C, -, .)
C	(C, .)
D	(C, ., +)

3.
2 MARKS

One of the following is field	
A	(R, +, .)
B	(Z, -, .)
C	(Z, ., -)
D	(Z, ., +)

4.
2 MARKS

Any of the following conditions be one of the conditions of a group	
A	commutative
B	distributive
C	associative
D	deleting

12. (3MARKS)

Which function is bijective?	
A	$f : R \rightarrow R, f(x) = x^3$.
B	$f : R \rightarrow R, f(x) = \sin x$.
C	$f : R \rightarrow R, f(x) = x^2$.
D	$f : R \rightarrow R, f(x) = \cos x$.

13. (3MARKS)

The composition function (g o f) of two functions $f(x) = 2x+3$ and $g(x) = x^2$ is	
A	$(g \circ f)(x) = 2x^2 + 3$
B	$(g \circ f)(x) = (2x + 3)^2$
C	$(g \circ f)(x) = 2x^2 + 3x+3$
D	$(g \circ f)(x) = 4x^2 + 12$

(11). (4MARKS) By using matrices solve the linear system

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

(III) (6marks) put True or false on the following:

(1) The transpose of a 5×6 matrix has five columns and six rows.   (   )
(2) If A is a 2×3 matrix and B is a 3×2 matrix, then A+B is defined.   (   )
(3)If A is an invertible 3×3 matrix and B is a 3×4 matrix, then $A^{-1}B$ is defined.   (   )

(4) If AB is defined, then BA must also be defined.   (   )
(5) If AX = B for any matrix A, then $X = A^{-1}B$.   (   )

(6)   If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$, then $A^{-1} = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ (   )

(IV) Solve the following questions:

1. (4 marks)   Prove that $3 + 6 + 9 + \cdots + 3n = \dfrac{3n(n+1)}{2}$ for all $n \in$ N by using mathematical induction.

2. (3marks) Construct the truse table of $\qquad$ $(p \wedge \sim q) \Rightarrow (p \vee q)$

2. (3 marks)   Prove That $A \times (B \cap C) = (A \times B) \cap (A \times C)$

3. (5 marks) Find the roots by Cardan,s method of the $x^3 - 9x + 28 = 0$

5.

2 MARKS

One of the following is proper fraction	
A	$\dfrac{2x^3 + x^2 - x - 3}{x(x-1)(2x+3)}$
B	$\dfrac{x^3}{(x+4)(x-1)}$
C	$\dfrac{x^4 - 3x^3 - 3}{x^2 - 4}$
D	$\dfrac{2+x}{1-x^2}$

6.

4MARKS

The partial fraction of the fraction $\dfrac{2x-3}{x(x-1)(2x+3)}$ is	
A	$\dfrac{1}{x} - \dfrac{1}{5(x-1)} - \dfrac{8}{5(2x+3)}$
B	$\dfrac{1}{x} + \dfrac{1}{(x-1)} + \dfrac{5}{8(2x+3)}$
C	$\dfrac{1}{x} - \dfrac{8}{5(x-1)} - \dfrac{1}{5(2x+3)}$
D	$\dfrac{1}{x} - \dfrac{1}{5(x-1)} + \dfrac{8}{(2x+3)}$

7.

3 MARKS

The statement $[(p \Leftrightarrow q) \Rightarrow (q \wedge r)] \vee (q \Leftrightarrow \sim r)$ is false in one case of the following	
A	P is true, q is true and r is true
B	P is false, q is false and r is false
C	P is false, q is true and r is true
D	P is false, q is false and r is true

8.

4 MARKS

	The cube roots of complex number 64i are
A	$2(\sqrt{3}+i),2(\sqrt{3}-i)$ and 4
B	$2(\sqrt{3}+i),2(\sqrt{3}-i)$ and 4i
C	$2(i\sqrt{3}+1),2(\sqrt{3}-i)$ and -4i
D	$2(\sqrt{3}+i),2(\sqrt{3}-i)$ and -4i

9. (3 MARKS)

	In Cardan method to solve the equaton $x^3+6x^2+3x+18=0$, the first step is delete the second term to get
A	$x^3-9x-28=0$
B	$x^3-9x+28=0$
C	$x^3+9x+28=0$
D	$x^3+9x-28=0$

10.(2MARKS)

	The relation "perpendicular to" on the set of all straight lines is:
A	reflexive.
B	symmetric.
C	transitive.
D	equivalent.

11.

(3MARKS)

	The domain of the function $f(x)=\sqrt{4-x^2}$ is the interval:
A	(-2,2).
B	[-2,2).
C	[-2,2].
D	(-2,2].

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