Time: 02 Hours

ll Questions

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Simplify the following expressions to the lowest terms.

i)
$$\frac{x^{m+2n} \times x^{3m-8n}}{x^{5m-4n}}$$

ii)
$$\left(\frac{5}{x+2} - \frac{1}{x-2}\right) \div \left(\frac{3}{2+x} + \frac{6}{2-x}\right)$$

Factor the following expressions completely.

i)
$$3x^2 - 12y^2$$

ii)
$$x^2 - 13x + 42$$

i)
If $x=36$, $y=32$ and $z=16$, then find the value of $\sqrt{\dfrac{x}{4}} - \sqrt[5]{y} + \sqrt[3]{4z}$.

ii)
If $3^{x-1} + 3^{x-1} + 3^{x-1} = (81)^y$, then find the value of $\dfrac{x}{y}$.

(25 Marks)

Solve the following equations.

i)   $10x^2 - 18x - 4 = 0$

ii)  $x^3 + 3x^2 - x - 3 = 0$

Solve the following simultaneous equations.

i)
$$x^2 + y^2 = 5$$
$$x - y = 3$$

ii)
$$4^{x-y} = 16$$
$$4^{x+y} = 256$$

As the number of units manufactured increases from 4000 units to 6000 units, the total cost of production increases from Rs. 22,000 to Rs. 30,000. Find the equation for the relationship between the cost and the number of units produced, if the relationship is linear.

(25 Marks)

a.
If $A = \begin{pmatrix} 3 & 4 \\ 1 & 1 \\ 2 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 1 & 2 \\ 1 & 2 & 4 \end{pmatrix}$, then find $(AB)^T$.

b.

Find the values of $x$ and $y$ if $\begin{pmatrix} 2 & 3y^3 \\ x^2 & -5 \end{pmatrix} = \begin{pmatrix} 2 & 81 \\ 9 & -5 \end{pmatrix}$.

c.

If $A + 3\begin{pmatrix} 1 & -1 & 0 \\ 1 & 2 & 4 \end{pmatrix} = \begin{pmatrix} 2 & 0 & 3 \\ 1 & 5 & 8 \end{pmatrix}$, then find $A$.

d.

Given the matrix $A = \begin{pmatrix} 1 & 2 & 0 \\ 1 & 0 & -1 \\ -1 & 3 & 2 \end{pmatrix}$, find the followings.

i)   Determinant                     ii)   Matrix of minors

iii)  Matrix of cofactors             iv)   Adjoint matrix

v)   Inverse matrix

(25 Marl

4.  a.

Two events $A$ and $B$ are such that $P(A) = \dfrac{1}{3}$, $P(B) = \dfrac{1}{4}$ and $P(A \cup B) = \dfrac{1}{2}$.

i)   Determine whether or not $A$ and $B$ are independent events.

ii)  Find $P\left( A \mid B^c \right)$.

b.  Events $A$ and $B$ are mutually exclusive and $P(A) = 0.2$, $P(B) = 0.5$. Find

i)      $P(A \cup B)$                          ii)      $P(A^c \cap B^c)$

c.  The survey of all households conducted in a certain area showed that 70% have a freezer an
20% have a washing machine and 80% have either a freezer or a washing machine or bot
appliances. Find the probability that a randomly chosen house hold from that area has bot
appliances.

d.  In a factory, machines A, B and C produce electronic components. Machine A produces 16% c
the components, machine B produces 50% of the components and machine C produces the res
Some of the components are defective. Machine A produces 4%, machine B 3% and machine
7% defective components.

i)   Draw a tree diagram to represent this information.

Find the probability that a randomly selected component is

ii)   produced by machine B and is defective.          iii)   Defective.

iv)   Given that a randomly selected component is defective find the probability that it wa
produced by machine B.

(25 Mark

2