CMP 501_Mathematics_Jan_2018

P131/CMP501/EE/20180114

Time : 3 Hours **Marks : 80**

Instructions :

1. All Questions are Compulsory.
2. Each Sub-question carry 5 marks.
3. Each Sub-question should be answered between 75 to 100 words. Write every questions answer on separate page.
4. Question paper of 80 Marks, it will be converted in to your programme structure marks.

1. Solve any **four** sub-questions.

a) Find the surface area S, of a rectangular parallelepiped with length 30cm, height 5cm and width 20cm? 5

b) Using principle of mathematical induction prove that the given statement is true for all natural numbers n. "1 1_n–6 is divisible by 5". 5

c) What is the simplification of: 5

i) $\frac{\left(3^7 \times 3^{-2} \times 3^0\right)}{3^4}$?

ii) $\frac{\left(2^3 \times 2^{-6} \times 2^6 \times 2^{-7}\right)}{2^4 \times 2^{-5}}$?

d) Find $(1.57)^5 = ?$ 5

e) i) If $A=\begin{vmatrix} 1 & 2 & 4 \\ 2 & -7 & 1 \end{vmatrix}$ and $B=\begin{vmatrix} 3 & 4 & -1 \\ 0 & 5 & 7 \end{vmatrix}$, Find A + B = ?

ii) $p(x)=6x^3+9x^2+\frac{1}{2}$ and $q(x)=4x^3+\frac{1}{4}x-4$ are two polynomials, then find their multiplication?

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2. Solve any **four** sub-questions.

a) Which of the following sets are singleton? 5

i) $A=\{x: x\in Z \text{ and } x-2=0\}$

ii) $B=\{y: y\in R \text{ and } y^2-2=0\}$

b) What is the Binary equivalent of decimal number 142. 5

c) Write the truth table of each of the following and determine whether it is a tautology or contradiction or a contingent statement $(pVq)V\sim p$. 5

d) i) (2 3 4) is a _____ matrix.

ii) $\begin{matrix}7\\3\\4\end{matrix}$ is a _____ matrix.

iii) $\begin{matrix}1&0&0\\0&1&0\\0&0&1\end{matrix}$ is a _____ matrix

iv) $\begin{vmatrix}1&2&3\\4&5&0\\5&7&3\end{vmatrix}$ is a singular matrix?

v) $\begin{vmatrix}1&7\\-4&5\\0&3\end{vmatrix}$ is a matrix of order .

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e) What is the number of all possible passwords for a computer system, if a password must consists of a sequence of five different letters from English alphabet? 5

3. Solve any **four** sub-questions.

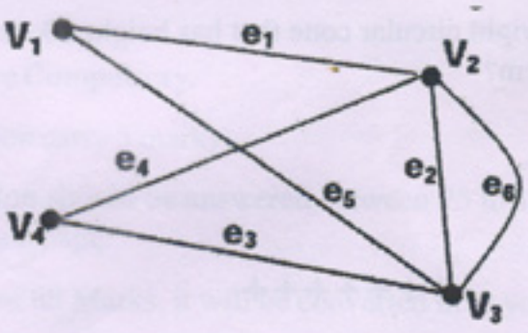
a) Write the power set of each of the following sets: 5

i) $A=\{x: x\in R \text{ and } x^2+7=0\}$

ii) $B=\{y: y\in N \text{ and } 1\le y\le 3\}$

b) $f(x) = 3x-2$ and $g(x) = 6x^2+8x-8$ are two polynomials, then their division of $g(x) / f(x) = (6x^2+8x-8) / (3x-2) = ?$ 5

c) i) Draw the adjacency matrix for the following:



ii) Simplify : $\frac{\log_2 8+\log_5 25+\log_3 81}{\log_2 32-\log_3 9}$

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d) i) Given that $A = \{2, 4\}$ and $B = \{x : x \text{ is a solution of } x^2+6x+8 = 0)$ are A and B disjoint sets?

ii) If $A = \{a, b, c\}$ and R is a relation on set A, where $R = \{(a, a), (b, b), (b, c), (c, c), (c, b)\}$. Then the matrix of relation R is?

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e) Represent following functions are one to one function or not? 5

i) $A = \{-2, -1, 1, 2, 3\}$ and $B = \{1, 4, 9, 25\}$ where $f: A \to B$ as $f(x) = x^2$.

ii) A function $f: R \to R$ defined by $f(x)=\frac{3x}{5}+2, x \in R$.

4. Solve any **four** sub-questions.

a) i) Find gof and fog when $f(x) = 2x+1$, $g(x) = x^2$.

ii) Define the term with the example : (a) Triangular matrix

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b) Four vowels a, e, o, u and eight consonants b, c, d, p, q, r, s, t from English alphabet. Find the number of five lettered words (meaningful or meaningless), containing 2 different vowels and 3 different consonants, from above 12 letters. 5

c) Solve the following equations by Cramer's rule $3x+4y-7=0$, $7x-y-6=0$. 5

d) Show that the vectors $5i+6j+7k$, $3i+20j+5k$ and $7i-8j+9k$ are coplanar. 5

e) i) What is the decimal equivalent of the hexadecimal number BCA?

ii) Find Volume of right circular cone that has height 20cm and the radius of the circular base 15cm? 5

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