Roll No. . Total Pages : 4

204103

c., 2018

BCA Ist Semester
MATHEMATICS
(BCA-17-103)

Time : 3 Hours] [Max. Marks : 75

Instructions :

(i) It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.

(ii) Answer any four questions from Part-B in detail.

(iii) Different sub-parts of a question are to be attempted adjacent to each other.

PART–A

1. (a) Define Set, Power set and Comparable set with examples. (1.5)

(b) Find X, if $Y = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ and $2X + Y = \begin{bmatrix} 1 & 0 \\ -3 & 2 \end{bmatrix}$. (1.5)

(c) Find all the co-factors of the matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & -5 & 6 \\ 7 & 0 & -1 \end{bmatrix}.$$

(1.5)

(d) If A = {2, 3, 4} and B = {3, 6, 8}. Find R where R is the relation 'x divides y' from set A to set B. Also find R^{-1}. (1.5)

(e) Evaluate $\lim_{x \to 2} \left(\frac{1}{x-2} - \frac{4}{x^3 - 2x^2} \right)$. (1.5)

(f) Differentiate the given function w.r.t. x : $\left(\sqrt{x} + \frac{1}{\sqrt{x}} \right)^2$. (1.5)

(g) Differentiate the given function w.r.t. x : $\frac{x}{1 + \tan x}$. (1.5)

(h) Integrate the given function w.r.t. x : $(2x + 1)^{1/3}$. (1.5)

(i) Using reduction formula, solve $\int \sin^6 x dx$. (1.5)

(j) State fundamental theorem of integral calculus. (1.5)

PART–B

2. (a) If A = set of all rational numbers and

$B = \{x : x^2 - 4x + 2 = 0\}$,

then write down $A \cap B$, $A - B$ and $B - A$. (7)

(b) Solve the given system of equations by using Crammer's Rule :

$6x + y - 3z = 5$; $x + 3y - 2z = 5$; $2x + y + 4z = 8$.

(8)

3. (a) If R be the relation in the set A = {1, 2, 3} given by R = {(1, 1), (2, 3), (3, 1), (2, 1), (2, 2), (3, 3)}, then show that (A, R) is a partial order set. (7)

(b) Show that $\lim_{x \to 0} \frac{e^{1/x} - 1}{e^{1/x} + 1}$ does not exit. (8)

4. (a) If $y = v^3 + 2v^2 + 5$, $v = 3u + 1$ and $u = 9x + 1$, then find dy/dx. (7)

(b) Find the derivative of the given function :

$y = \log (a + b \tan x) - \log (a - b \tan x)$. (8)

5. (a) Solve the given integral, $\int \left(\sqrt{\tan x} + \sqrt{\cot x}\right) dx$. (7)

(b) Evaluate : $\int \frac{dx}{5 + 4\cos x}$. (8)

6. (a) In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers. Then find (i) the number of people who read atleast one of the newspapers. (ii) the number of people who read exactly one newspaper. (7)

(b) Show that $f(x) = \frac{1}{x - a}$ has a discontinuity of second kind at x = a. (8)

7. (a) Prove that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$ if $x^y = e^{x-y}$. (7)

(b) Evaluate the given definite integral :

$$\int_1^2 \frac{dx}{\sqrt{x^2+4x+3}}.$$ (8)