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6. (a) Differentiate $y = \frac{\sqrt{x}}{\sqrt{x}}$ w. r. t x

(b) Differentiate $\frac{x^2}{x}$ w. r. t x

7. (a) Differentiate $t = \frac{\sqrt{1+x^2-1}}{x}$ w. r. t x

(b) Differentiate $(x)^x$ w. r. t x

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8. (a) Evaluate $\int x\sqrt{x} dx$

(b) Evaluate $\int \frac{\sin x}{\sin x} dx$

9. (a) Evaluate $\int e^{ax} + c dx$

(b) Evaluate $\int \sqrt{3-3x^2} dx$

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Roll No.

97663

**B.C.A. 1st Semester (New)
Examination- November, 2016**

Mathematics

Paper-BCA-103

Time : 3 hours

Max. Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note : Attempt **five** questions in all, selecting **one** question from each unit. Q. No. 1 is **compulsory**.

Section-A

1. (a) Find x and y, if $(2x, x + y) = (6, 2)$

(b) If $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$; find the value of x.

- (c) Show that the relation R in the set $\{1, 2, 3\}$ given by $R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 1)\}$ is reflexive but not symmetric.

(d) $\lim_{\theta \rightarrow 0} \frac{\sin a\theta}{\sin b\theta}$

(e) Differentiate $\sin^{-1} x$ w.r.t x

(f) Differentiate $\tan^{-1} x$ w.r.t x

(g) Evaluate $\int \sec^{-1} x dx$

(h) Evaluate $\int \frac{x^2}{1+x^2} dx$

2. (a) Prove that $(A \cup B)' = A' \cap B'$

(b) If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$

and $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$, find $(A \cup B)'$ so that $A^2 = K I$.

relation R in the set $\{1, 2, 3\}$ given by $R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 1)\}$ is reflexive but not symmetric.

B

$A' \cup B'$

$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$; then find $(A \cup B)'$

$K I$

3. (a) Prove that

$$\begin{vmatrix} 1 & x & x^3 \\ 1 & y & y^3 \\ 1 & z & z^3 \end{vmatrix} = (x-y)(y-z)(z-x)(x+y+z)$$

(b) If $A = \begin{bmatrix} 2 & 1 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$, verify that $A (\text{adj } A) = |A| I_3$

$|A| I_3$

Unit-II

4. (a) In the set of integers, let relation R be defined as $a R b$ if and only if $a - b$ is even. Prove that R is an equivalence relation.

(b) Write the Range of $y = \sqrt{(x-3)(5-x)}$

5. (a) Evaluate $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{\sin^3 x}$

(b) If $f(x) = \begin{cases} 4 & , \text{ if } x \leq -1 \\ ax^2 + b & , \text{ if } -1 < x < 0, \\ \cos x & , \text{ if } x \geq 0 \end{cases}$

then find the values of a and b so that the given function is continuous.

Handwritten calculations for question 5(b):

$$\begin{matrix} 1 & 4 & 2 \\ 1 & 4 & 2 \\ 1 & 4 & 2 \\ \hline 4 & 12 & 6 \end{matrix}$$

$$\begin{matrix} 1 & 2 \\ 1 & 2 \\ 1 & 2 \\ \hline 3 & 6 \end{matrix}$$