7. Differentiate the following w.r.t. x :

(i) $\dfrac{e^x \log x}{x^2}$

(ii) x^{x^2}

(iii) $\tan^{-1}\left(\dfrac{a-x}{1+ax}\right)$

(iv) $\sqrt{\dfrac{(x-a)(x-b)}{(x-p)(x-q)}}$

UNIT – IV

8. Evaluate the following :

(i) $\displaystyle\int \dfrac{x^4+1}{x+1}\,dx$

(ii) $\displaystyle\int \dfrac{dx}{1+2\cos x}$

9. Evaluate the following :

(i) $\displaystyle\int_{0}^{\pi/2} x\sin^2 x$

(ii) $\displaystyle\int \sqrt{1+2x-x^2}\,dx$

Roll No. ....

97663

BCA 1st Semestwer (New)
Examination – November, 2019

MATHEMATICS
Paper : BCA-103

Time : Three Hours]   *[Maximum 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 examination.

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

1. (a) Given that $A = \{0, 1, 2, 3, 4, 5\}$, $B = \{1, 3, 5\}$. Find $A - B$.

(b) If $\begin{bmatrix} x & 3x-y \\ 2x+z & 3y-w \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 4 & 7 \end{bmatrix}$, find x, y, z, w.

(c) If $f(x) = x^5 - \dfrac{1}{x^5}$, find the value of $f(x) + f\left(\dfrac{1}{x}\right)$.

(d) Find $\lim\limits_{x \to 0} \dfrac{1 - \cos x}{x}$.

(e) If $y = (1 + x)\sqrt{x}$, find $\dfrac{dy}{dx}$.

(f) If $y = \sin \sqrt{x}$, find $\dfrac{dy}{dx}$.

(g) Evaluate $\int (3x - 4)^{1/3}\, dx$.

(h) Evaluate $\int \dfrac{3x^2}{1 + x^3}\, dx$.

UNIT – I

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

(b) In a group of 400 people, 250 can speak English only and 70 can speak Hindi only. Find :

(i) How many can speak both English and Hindi ?

(ii) How many can speak English ?

(iii) How many can speak Hindi ?

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) Solve $2x + 3y + 3z = 5$, $x - 2y + z = -4$, $3x - y - 2z = 3$.

UNIT – II

4. (a) In $N \times N$, show that the relation defined by (a, b) $R(c, d)$ if and only if $ad = bc$ is an equivalence relation.

(b) If $f, g : R \to R$ are defined respectively by $f(x) = x^2 + 3x + 1$, $g(x) = 2x - 3$, find (i) fog (ii) gof (iii) fof (iv) gog.

5. (a) Find :

(i) $\lim\limits_{x \to 0} \dfrac{\sin x - \tan x}{(e^x - 1)}$　　(ii) $\lim\limits_{x \to 0} \dfrac{\sqrt{1 + x} - 1}{x}$

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

UNIT – III

6. (a) Derivative of $\sin x$ from first principle.

(b) Differentiate the following w.r.t. x :

(i) $\dfrac{x^2 - 1}{(x^2 + 7x + 1)}$　　(ii) $\dfrac{2}{x + 1} - \dfrac{x^2}{3x - 1}$