Roll No……………………

BCA -10(Bachelor of Computer Application)

Second Semester, Examination-2012

BCA – 205

Mathematics II

Time: 3 Hours **Max Marks: 60**

Note: The Question paper is divided into three sections A, B and C. Answer the questions as per instructions given in each section.

Section –A

(Long Answer's Question)

Note: Answer any two questions. Each question carries 15 marks.
2 $\times$ 15=30

1. Prove that the greatest integer function *[x]* is continuous at all points except at
Integer points.
2. Find the area bounded by the curve $x^2 = 4y$ and the straight line $x = 4y - 2$.
3. Prove that a sequence of real numbers converges if and only if it is a Cauchy Sequence.
4. Show that the circle on the chord $x\cos\alpha + y\sin\alpha = p$ of the circle $x^2 + y^2 = a^2$ as
Diameter is $x^2 + y^2 - a^2 - 2p(x\cos\alpha + y\sin\alpha - p) = 0$.

Section – B

(Short Answer's Question)

Note: Answer any four questions. Each question carries 5 marks. **4 $\times$ 5=20**

1. Evaluate $\lim_{x \to \frac{\pi}{2}} \frac{1 - \sin x}{\left(\frac{\pi}{2} - x\right)^2}$

2. Discuss the continuity of the function *f(x)* at *x = 2*

$$f(x) = \begin{cases} 2 - x, & x < 2 \\ 2 + x, & x \geq 2 \end{cases}$$

3. Evaluate $\int \frac{4(\sin^{-1} x)^3}{\sqrt{1 - x^2}} dx$

4. Evaluate $\int \frac{\sin^{-1} x}{(1 - x)^{3/2}} dx$

5. Show that the sequence $< S_n >$, where

$$S_n = \frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} \ldots\ldots\ldots\ldots + \frac{1}{n+n}$$, is convergent.

6. Find two positive numbers x and y such that x + y = 60 and xy^3 is maximum.

7. For what value of k will the straight line $3x+4y=k$ touch the circle?
$x^2+y^2=10x.$

8. Prove that $\sin^{-1}x+\cos^{-1}x=\frac{\pi}{2}$.

Section – C

Objective Question (Compulsory)

Note: Answer all questions. Each question carries 1 mark. 10 $\times$1 =10

Note: Write True/False against the following-

1. Every constant function is continuous everywhere (True / False)

2. Every convergent sequence has a unique limit. (True/ False)

3. The equation of the straight line which cuts off intercepts a and b respectively from
the x and y - axis is $\frac{x}{a}+\frac{y}{b}=1$. (True/ False).

4. Definite integration satisfies the property $\int_a^b f(x)dx=\int_a^b f(t)dt$.
(True/ False)

5. The value of e lie between 2 and 3. (True/ False).

Choose the correct alternative.

6. If $n\in Q, than \lim_{x\to a}\frac{x^n-a^n}{x-a}$ is:

(a) $(n-1)a^n$ (b) na^n (c) na^{n-1} (d) None of these.

7. The value of $\int_o^{\pi/4} \tan^2 x\,dx$ is:

(a). $\pi/4$ **(b).** $(\pi/4)^2$ **(c).** $(1-\pi/4)$

(d). $\pi/2$

(8) The distance between the line 12x – 5y +9= 0 and the point (2, 1) is:

(a) 13/28 (b) 28/13 (c) 14/27 (d) 23/14

(9) For any sequence $\{a_n\}$ and $\{b_n\}$ of real numbers. We always have

(a). $\lim_{x\to\infty} Sup(a_n + b_n) = \lim_{x\to\infty} Supa_n + \lim_{x\to\infty} Supb_n$

(b). $\lim_{x\to\infty} Sup(a_n + b_n) \le \lim_{x\to\infty} Supa_n + \lim_{x\to\infty} Supb_n$

(c). $\lim_{x\to\infty} Sup(a_n + b_n) \ge \lim_{x\to\infty} Supa_n + \lim_{x\to\infty} Supb_n$

(d). None of the above.

10. The equation of the circle whose center is (2, -3) and radius is 8 will be:

(a). $x^2 + y^2 - 4x + 6y - 51 = 0$

(b). $x^2 - y^2 + 4x + 6y - 51 = 0$

(c). $x^2 + y^2 - 4x - 6y + 51 = 0$

(d). None of these.