June 2017

Bachelor of Computer Application (BCA) Examination

II Semester

Mathematics - II

Time : 3 Hours] [Max. Marks : 40

Note: *All questions are compulsory and carry equal marks. Solve any two parts from each question.*

1. (a) Trace the curve $y^2(2a-x)=x^3$.

(b) Trace the curve $r=2a\cos\theta$.

(c) Test the convergence of the integral : $\int_0^\infty \frac{\cos mx}{x^2+a^2}.dx$.

2. (a) Prove that : $\Gamma m \Gamma\left(m+\frac{1}{2}\right)=\frac{\sqrt{\pi}}{2^{2m-1}}.\Gamma 2m$, where $m>0$.

(b) Prove that : $\int_0^{\pi/2}\frac{dx}{\sqrt{\sin x}}\times\int_0^{\pi/2}\sqrt{\sin x}\,dx=\pi$.

(c) Find the whole length of the curve : $y=\frac{1}{2}x^2-\frac{1}{4}\log x$ from $x=1$ to $x=2$.

3. (a) Evaluate :

$$\int_0^3\int_0^2\int_0^1 (x+y+z)dx.dy.dz.$$

(b) Using Stoke's theorem, evaluate :

$$\int_C e^x dx+2y\,dy-dz.$$

where C is the boundary of the circle in the plane $z=2$.

(c) If S is any closed surface enclosing a volume V and $F=xi+2yj+3zk$ then show that :

$$\int_S F.\hat{n}dS=6V.$$

4. (a) If $u=\log(x^3+y^3+z^3-3xyz)$ then prove that :

$$\left(\frac{\partial}{\partial x}+\frac{\partial}{\partial y}+\frac{\partial}{\partial z}\right)^2.u=\frac{-9}{(x+y+z)^2}.$$

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(b) Lef $f(x,y)=\begin{cases}\frac{x^3-y^3}{x^2+y^2} & ,(x,y)\neq(0,0)\\ 0 & ,(x,y)=(0,0)\end{cases}$

Show that f(x, y) is continuous but not differentiable at (0, 0),

(c) Expand $f(,y)=x^2+xy-y^2$ by Taylor's theorem in power of $(x-1)$ and $(y+2)$

5. (a) Discuss the maxima and minima of the function :

$$u=xy+\frac{a^3}{x}+\frac{a^3}{y}.$$

(b) Test for convergence of the following series :

$$u_n=\frac{\sqrt{n}}{n^2+1}$$

(c) Test the convergence of the following series :

$$\frac{x}{1.2}+\frac{x^2}{3.4}+\frac{x^3}{5.6}+\ldots\ldots,\ x>0.$$

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