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Total No. of Questions : 05

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Code No. : B-420(B)

Annual Examination - 2017

Class BCA-III

BCA-301 **Paper- I**

CALCULUS & GEOMETRY

Max.Marks : 50

Time : 3 Hrs. **Min.Marks : 20**

Note : Attempt any two parts from each unit. All questions carry equal marks.

Unit-I

Q-1.(a)Let $f:[a,b]\to R$ be a bounded function on $[a,b]$. Prove that $f\in R[a,b]$ iff for every $\in>0$, there exists a partition P of [a,b] s.t.

U (p, f)-L (p, f) $<\in$

(b) Let $f(x)=x^2$ on[0, a], a>0 show that $f\in R[0,a]$ and

$$\int_0^a x^2\ dx = a^3/3$$

(c) State and prove the fundamental theorem of Integral Calculus.

Unit-II

Q-2.(a)Discuss the maximum or minimum values of the function :

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

P.T.O.

(b) Find the minimum distance from the origin to the plane x+2y-2z-12=0

(c) Find the maximum and minimum value of $u = a^2x^2 + b^2y^2 + c^2z^2$ where $x^2 + y^2 + z^2 = 1$ and $lx + my + nz = 0$

Unit-III

Q-3.(a) Test the convergence of $\int_2^\infty \frac{dx}{\sqrt{x^2-1}}$

(b) Test the convergence $\int_a^\infty e^{-x} \frac{Sin\, x}{x^2}\, dx$ *where* $a > 0$

(c) Prove that the integral $\int_a^b \frac{dx}{(x-a)\sqrt{b-x}}$ diverges.

Unit-IV

Q-4.(a) Show that the plane : ax+by+cz=0 cuts the cone $yz + zx + xy = 0$ in two perpendicular lines if $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$

(b) The plane $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$ meets the co-ordinates axes in A, B, C

Prove that the equation of the cone genrated by the lines drawn from 0 to meet the cirde ABC is

$$yz\left(\frac{b}{c}+\frac{c}{b}\right)+zx\left(\frac{c}{a}+\frac{a}{c}\right)+xy\left(\frac{a}{b}+\frac{b}{a}\right)=0$$

(c) Find the equation of right circular cylinder whose radius is 3 and axis is $\frac{x-1}{2}=\frac{y-3}{2}=5-z$

Unit-V

Q-5.(a) Prove that the polar equation of a conic is $\frac{l}{r}=1+e\cos\theta$ where the focus is a pole.

(b) If Psp' is a focal chord of a conic whose focus is S and the equation is $\frac{l}{r}=1+e\cos\theta$ then prove that $\frac{1}{sp}+\frac{1}{sp'}=a$ constant.

(c) Find the polar equation of a straight line which is at a distance P from the pole and the perpendicular from the pole to the line makes an angle α with the initial line.

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