2022

(May)

COMPUTER APPLICATION

Foundation Course

(*Mathematics-II*)

Course Code : **BCA-FC-T6-201**

Credit : **6**

Total Marks : 80 Time : 3 Hours

The figures in the margin indicate full marks for the questions

1. Answer the following : 1×8=8

(*a*) Write the value of $\lim_{x \to 2-} \frac{1}{(x-2)^3}$

(*b*) Define homogeneous function of three variables.

(*c*) What is critical number for a derivable function $f(x)$?

(*d*) Write down the disk formula for volume.

(*e*) What is the Laplace transform of $cos3t$.

(*f*) Define partial derivative of a function $f(x,y)$ *w.r.t.x.*

(*g*) If $f'(x_0)=0$ *and* $f''(x_0)>0$, then f has a _____ at x_0.

(Fill in the blank)

Contd 2

(*h*) State the intermediate value theorem.

2. Answer the following : 2×8=16

(*a*) State Rolle's theorem.

(*b*) If $f(x,y)=x^3y+e^x$ find f_x and f_y.

(*c*) Find $\int_0^{\pi/2} cos^3\, dx$

(*d*) What are solid of revolution and axis of revolution ?

(*e*) Evaluate : $\lim_{x\to 0} \frac{x+sin2x}{x-sin2x}$.

(*f*) Evaluate : $\int_{-1}^{1} |x|\, dx$

(*g*) Write Walli's formula.

(*h*) State the geometrical interpretation of the "Law of the Mean".

3. Answer ***any seven*** of the following : 5×7=35

(*a*) Give an example of a continuous function at a point, but is not differentiable at that point. Justify your example.

(*b*) State Taylor's theorem. Use it to expand $2x^3+7x^2+x-6$ in powers of $(x-2)$.

(*c*) Find the extreme values of x^3+2x^2-4x-8

(*d*) Obtain the reduction formula for $\int tan^n x\, dx$

(e) Find the area bounded by the parabola $y^2 = 4x$ and the line $y = 2x - 4$.

(f) Evaluate : $L\left\{\left(5e^{2t} - 3\right)^2\right\}$

(g) If $U = log\left(x^3 + y^3 + z^3 - 3xyz\right)$, then show that $U_x + U_y + U_z = \frac{3}{x+y+z}$

(h) If $v = cot^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$, then show that $x\frac{\partial v}{\partial x} + y\frac{\partial v}{\partial y} + \frac{1}{4}\sin 2v = 0$

(i) Evaluate : $\lim_{x \to 0} (\cos x)^{1/x^2}$

4. Answer ***any three*** of the following : 7×3=21

(a) State Lagrange's MVT. Use it to show that –

$$\frac{v-u}{1+v^2} < \tan^{-1} v - \tan^{-1} u < \frac{v-u}{1+u^2}$$

for $0 < u < v$.

(b) Investigate for the extreme values of $f(x,y) = x^3y^2(1-x-y)$.

(c) Using calculus find volume and surface area of the solid of revolution formed by rotation of the circle $x^2 + y^2 = a^2$ about the $x-axis$.

(d) Find the inverse Laplace transform of $\frac{3S+7}{S^2 - 2S - 3}$.

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