Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

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[Total No. of Questions: 09] [Total No. of Pages: ......]

Uni. Roll No. ....

Program: B.Tech. (Batch 2018 onward)

Semester: $1^{st}/2^{nd}$

Name of Subject: Mathematics II

Subject Code: BSC-104

Paper ID: 15940

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A **[Marks: 02 each]**

Q1.

a) Write the function for saw toothed wave form and justify its name.

b) Is there any difference between multiple pints or double points in a curve. Give reasons. Discuss two different types of double points.

c) If an error of 2% is made while measuring the sides of a square, find the error in calculating its area.

d) State Gauss's Divergence theorem.

e) Change the order of integration in the integral $\int_0^1 \int_{x^2}^{2-x} f(x)\,dydx$,when it is given that the points of intersection of the two curves are (1,1) and (-2,4)

f) Give physical Interpretation of curl.

Part – B **[Marks: 04 each]**

Q2. Express f(x) = |x| , -π <x< π, as a Fourier series.

Q3. Define implicit function and hence find derivative of y w.r.t. x for the implicit function $x^3 + y^3 = 6xy$ using the method of partial differentiation

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Q4. If $f(x) = \begin{cases} x, 0 < x < \frac{\pi}{2} \\ \pi - x, \frac{\pi}{2} < x < \pi \end{cases}$, then find the half range sine series expansion

Q5. Evaluate $\iint r^2 dr d\theta$ over the area included between the circles r=2sinθ and r = 4sinθ

Q6. If $z = e^{ax+by} f(ax - by)$, then find the value of $b\frac{\partial z}{\partial x} + a\frac{\partial z}{\partial y}$

Q7. Find the value of $\nabla . \left\{ r\nabla\left(\frac{1}{r^3}\right)\right\}$

Part – C **[Marks: 12 each]**

Q8. Trace the curve $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$ by discussing all its important points like symmetry, Origin, points of intersection with axes, asymptotes, tangents and region etc.

OR

The sum of three positive numbers is constant .Prove that their product is maximum when they are equal

Q9. Evaluate $\iiint z(x^2 + y^2) dxdydz$; where V = {(x,y,z): $x^2 + y^2 \le 1, 2 \le z \le 3$ }

OR

Apply Green's theorem to evaluate $\oint_C [(2x^2 - y^2)dx + (x^2 + y^2)dy]$, where C is the circle $x^2 + y^2 = a^2$

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