End Term Assessment– Nov/Dec 2020

Semester –III

(B.Tech. (CSE) Common for 2014,2015,2016 batches)

Subject Code: MA0211 **Subject Name: Mathematics-III**

Duration: 2 hours (including time for uploading)

(10 Minutes Max Grace time) **Max. Marks: 50**

Instructions

- **Write name and registration number, page number, on all the pages, convert into one PDF, tag it with your registration number_Name_subjectcode_subject title**

- **The Assessment consists of 2 sections**
    - **Part A contains 10 questions of 2 marks each and all questions are compulsory.**
    - **Part B consists of 4 questions of 10 marks each, out of which 3 questions to be attempted.**
- **Hand written responses to be submitted/uploaded as scanned pages of answer sheets (max. 5 pages) within the mentioned duration. 6th page and onwards won't be evaluated**

PART – A

2 * 10 =20 Marks (Each answer- Word Limit- 50 Words)

1. Write Dirichlet's conditions of a Fourier series?

2. Find the constant a_0 of the Fourier series for the function $f(x) = k,\ 0 \le x \le 2\pi$.

3. Form the partial differential equation by eliminating the arbitrary functions from

$z = f(x + y)$.

4. Solve $(D^2 - 3DD' + 2D'^2)\, z = 0$.

5. Classify the equation:

$$\frac{\partial^2 u}{\partial x^2} + 4\frac{\partial^2 u}{\partial x \partial y} + 4\frac{\partial^2 u}{\partial y^2} - 12\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + 7u = x^2 + y^2 .$$

6. What are the assumptions made before deriving the one dimensional heat equation?

7. State initial condition for wave equation.

8. Write all variable separable solutions of the two dimensional heat equation in steady – state condition.

9. Find Fourier sine transform of $f(x) = \begin{cases} k & if\ x \le 1 \\ 0 & if\ x > 0 \end{cases}$.

10. Write the finite Fourier cosine transform as well as the inverse finite Fourier cosine transform formulae.

PART – B

10 * 3 = 30 Mark (Each answer- Word limit- 250 words)

11. Find a Fourier series to represent $x - x^2$ from $x = -\pi\ to\ x = \pi$. Hence show that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots\dots\dots = \frac{\pi^2}{12}.$$

12. (i) Solve $x(y - z)p + y(z - x)q = z(x - y)$.

(ii) Solve $(D^2 - DD')\, z = \sin x \cos 2y$.

13. A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially in a position given by $y(x, 0) = a\ sin\ (\pi x/l)$. If it is released from rest find the displacement y at any time t and at any distance x.

14. (i) Using Parseval's identities, prove that $\int_0^\infty \frac{dt}{(4+t^4)(9+t^2)} = \frac{\pi}{60}$.

(ii) Find the Fourier cosine and sine transforms of e^{-ax}, $a > 0$.