JC BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY YMCA, FARIDABAD

1st SESSIONAL EXAM (SEPTEMBER 2023)

B.Tech. MECHANICAL 3rd SEM: MATH-III

TIME 1: 30 Hrs. MM : 15

Q.1 Solve the partial differential equation

$$\frac{\partial^2 z}{\partial x^2} - 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = e^{2x-y} + \cos(x+2y)$$ (5)

Q.2 i) Form partial differential equation by eliminating arbitrary constants from

$2z=\frac{x^2}{a^2}+\frac{y^2}{b^2}$.

ii) Form partial differential equation by eliminating arbitrary function from

$z=f(x+it)+g(x-it)$. (5)

Q.3 The points of trisection of a string are pulled aside through the same distance on opposite sides of the position of equilibrium and the string isreleased from rest. Derive an expression for the displacement of the string at subsequent time and show that the midpoint of the string always remains at rest. (5)

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JC BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY, YMCA FARIDABAD

2ND SESSIONAL EXAM (NOVEMBER 2023)

B.Tech. (3RD SEM) MECHANICAL: MATHS-III

TIME- 1:30 Hrs. MM-15

Q.1 Define: (i) Spearman's coefficient of correlation

(ii) Quartile deviation and Leptokurtic curve. (3)

Q.2 Prove that Poisson distribution is a limiting case of Binomial distribution. (3)

Q.3 In a book of 520 pages, 390 typo-graphical errors occur. Assuming Poisson law for the number of errors per page, find the probability that a random sample of 5 pages will contain no error. (2)

Q.4 The first four moments of a distribution about the value 4 of the variable are -1.5, 17, -30 and 108. Find the moments about mean, β_1 and β_2. (4)

Q.5 The random variables X and Y are jointly normally distributed and U and V are defined by U= X cos(α) + Y sin(α) and V= Y cos(α) – X sin(α). Show that U and V are uncorrelated if

$$\tan(2\alpha) = \frac{2r\sigma_X\sigma_Y}{\sigma^2_X - \sigma^2_Y}$$ (3)