

2E2401	Roll No. _____	Total No of Pages: 3
	2E2401	
	B. Tech. II-Sem. (Back) Exam., Oct.-Nov. - 2020	
	BSC	
2FY2 – 01 Engineering Mathematics - II		

Time: 2 Hours

Maximum Marks: 110
Min. Passing Marks: 39

Instructions to Candidates:

Attempt all ten questions from Part A, four questions out of seven questions from Part B and two questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL

2. NIL

PART - A

(Answer should be given up to 25 words only)

[10×3=30]

All questions are compulsory

Q.1 Suppose a matrix A has rank 5 and we find a matrix B after applying elementary column operations on A. What will be the rank of B?

Q.2 State Cayley - Hamilton theorem.

Q.3 Identify the functions p(t) and q(t) if the differential equation

$$\frac{dx}{dt} = \frac{x+t^2-2x\sqrt{t}}{t}$$

is written in the form $dx/dt + p(t)x = q(t)$.

Q.4 Solve $(y - px)(p - 1) = p$.

Q.5 Find solution of the following differential equation

$$\frac{d^4 y}{dx^4} - a^4 y = 0.$$

Q.6 Find Particular Integral (PI) of differential equation.

$$(D^2 + 2D + 1) y = e^x.$$

Q.7 Write the general linear partial differential equation of first order having two independent variables and one dependent variable. <http://www.rtuonline.com>

Q.8 Solve -

$$\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{xy}.$$

Q.9 Classify the following partial differential equation.

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0.$$

Q.10 Write the equations for one dimensional heat and wave equations.

PART - B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

Q.1 Test consistency, for the following system of equations and if possible, solve them -

$$x + y + z = 6, x - y + 2z = 5, 3x + y + z = 8, 2x - 2y + 3z = 7.$$

Q.2 If A be a 3×3 matrix with real entries whose eigen values are 1, -1, 2. Suppose that for $\alpha, \beta, \gamma \in \mathbb{R}$

$$\alpha A^{-1} = -A^2 + \beta A + \gamma I$$

Where I is the 3×3 identity matrix. The find value of α, β, γ .

Q.3 Solve the differential equation $y + px = x^4 p^2$.

Q.4 Solve -

$$(1 + 2x)^2 \frac{d^2 y}{dx^2} - 6(1 + 2x) \frac{dy}{dx} + 16y = 8(1 + 2x)^2.$$

Q.5 Solve $(x + 1) \frac{d^2 y}{dx^2} - 2(x + 3) \frac{dy}{dx} + (x + 5)y = e^x$.

Q.6 Find the complete integral of $(x + y)(p + q)^2 + (x - y)(p - q)^2 = 1$.

Q.7 Solve the following partial differential equation by separation of variables

$$\frac{\partial z}{\partial x} = 16 \frac{\partial z}{\partial y}, \quad z(0, y) = 4e^{-5y}$$

PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

[2×20=40]

Attempt any two questions

Q.1 Find Eigen values and Eigen vectors of the matrix -

$$A = \begin{bmatrix} 2 & -3 & 3 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$$

Q.2 Solve $(2ydx + 3xdy) + 2xy(3ydx + 4xdy) = 0$.

Q.3 Find the power series solution of equation

$$2x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + (1 - x^2)y = 0.$$

Q.4 Solve $2zx - px^2 - 2qxy + pq = 0$ by Charpit's method.

Q.5 Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$, satisfying the condition $u(0, y) = u(l, y) = u(x, 0) = 0$ and

$$u(x, a) = \sin \frac{\pi x}{l}.$$

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