



PAPER ID-411024

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Subject Code: RAS203

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BTECH
(SEM II) THEORY EXAMINATION 2023-24
ENGINEERING MATHS-II

TIME: 3 HRS**M.MARKS: 70**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A**1. Attempt all questions in brief.****2 x 7 = 14**

Q no.	Question	Marks	CO
a.	Find order and degree of the equation $(\frac{d^3y}{dx^3})^4 - (\frac{dy}{dx})^3 = 0$.	2	1
b.	Find the particular integral of $(D^2 + 6D + 5)y = 4e^{-x}$	2	1
c.	Write the value of $J_{-1/2}(x)$.	2	2
d.	Find the Laplace Transform of unit step function $u(t-a)$.	2	3
e.	Find the constant term if $f(x) = x + x^2$ is expanded in Fourier series defined in $(-1, 1)$.	2	4
f.	Classify the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$.	2	5
g.	Write two dimension heat equation and its solution.	2	5

SECTION B**2. Attempt any three of the following:****7 x 3 = 21**

Q no.	Question	Marks	CO
a.	Solve: $(D^2 - 2D + 5)y = e^{2x} \cos x$.	7	1
b.	State and prove Rodrigue's formula for Legendre's polynomials	7	2
c.	Find the Laplace transform of $\frac{\cos at - \cos bt}{t}$.	7	3
d.	Find the half range Fourier sine series $f(x) = x^2$ in $0 < x < 1$.	7	4
e.	Find the displacement of a finite string of length 'l' that is fixed at both end and released from rest with an initial displacement $f(x)$.	7	5

SECTION C**3. Attempt any one part of the following:****7 x 1 = 7**

Q no.	Question	Marks	CO
a.	Solve the following simultaneous differential equation: $\frac{dx}{dt} + 5x - 2y = t, \quad \frac{dy}{dt} + 2x + y = 0$	7	1
b.	Solve by method of variation of parameter $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = \frac{e^t}{1+e^t}$.	7	1

4. Attempt any one part of the following:**7 x 1 = 7**

Q no.	Question	Marks	CO
a.	Show that $n P_n(x) = x P_n'(x) - P_{n-1}'(x)$.	7	2
b.	Find the series solution of the following differential equation using Frobenius method $2x^2 \frac{d^2y}{dx^2} + 7x(x+1) \frac{dy}{dx} - 3y = 0$.	7	2



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TIME: 3 HRS**M.MARKS: 70****5. Attempt any one part of the following:****7 x 1 = 7**

Q no.	Question	Marks	CO
a.	Find inverse Laplace transform of $\frac{1}{p(p^2-a^2)}$.	7	3
b.	Use convolution theorem to find the inverse Laplace transform of $\frac{p}{(p^2+a^2)^2}$.	7	3

6. Attempt any one part of the following:**7 x 1 = 7**

Q no.	Question	Marks	CO
a.	Solve ($D^2 - DD' - 2D'^2 + 2D'$ +2D)z = Sin (2x+ y).	7	4
b.	Expand $f(x) = x \cos x$ as Fourier series in $-\pi < x < \pi$.	7	4

7. Attempt any one part of the following:**7 x 1 = 7**

Q no.	Question	Marks	CO
a.	Solve by Method of separation of variable: $y^3 \frac{\partial u}{\partial x} = x^2 \frac{\partial u}{\partial y}$.	7	5
b.	Find the temperature distribution in a rod of length of 2m whose ends are fixed at temperature zero and initial temperature distribution is $f(x) = 100x$.	7	5