

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination Dec 2021 and Jan 2022

Course: Mathematical Physics
Program: M.Sc. Physics
Course code: PHYS 7014

Semester: I
Time 03 hrs.
Max. Marks: 100

SECTION A

- Each Question will carry 4 Marks
- Instruction: Complete the statement / Select the correct answer(s)

S. No.	Question	CO
Q 1	Find the value of a, b and c such that $\vec{F} = (3x - 4y + az)\hat{i} + (cx + 5y - 2z)\hat{j} + (x - by + 7z)\hat{k}$ is irrotational.	CO1
Q2	Define Unitary matrix with example.	CO1
Q3	Prove that for beta function : $\beta(l, m) = \beta(m, l)$	CO1
Q4	A fair coin is tossed 6 times. Find the probability of getting (a) exactly 2 heads (b) no heads	CO1
Q5	Find the Laplace transform of $f(t) = t^3 e^{-3t}$.	CO4

SECTION B

- Each question will carry 10marks
- Instruction: Write short / brief notes

Q 6	Solve $\frac{dy}{dx} = \frac{1}{x+y}$ for $x=0.5$ by using Runga –Kutta method with $x_0 = 0, y_0 = 1$, taking $h = 0.5$ Or Solve $\frac{d^2y}{dx^2} = x + y$, with initial condition $y(0)=y(1)=0$ by forward finite difference method.	CO3																						
Q 7	The velocity v (Km/min) of a moped which starts from rest, is given at fixed interval of time t (min) as follows <table border="1" style="width:100%; text-align:center;"> <tbody> <tr> <td>t (min)</td> <td>2</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> <td>12</td> <td>14</td> <td>16</td> <td>18</td> <td>20</td> </tr> <tr> <td>v (Km/ min)</td> <td>10</td> <td>18</td> <td>25</td> <td>29</td> <td>32</td> <td>20</td> <td>11</td> <td>5</td> <td>2</td> <td>0</td> </tr> </tbody> </table> Estimate approximately distance covered in 20 minutes.	t (min)	2	4	6	8	10	12	14	16	18	20	v (Km/ min)	10	18	25	29	32	20	11	5	2	0	CO3
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