

Name:

Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Examinations (Online Mode), Jan-Feb 2021**

**Course:** Remedial Mathematics

**Semester:** I

**Program:** B.Sc (CR)

**Time:** 3 Hrs

**Course Code:** BP106RMT

**Max. Marks:** 100

**SECTION - A**

**6 x 5 = 30 Marks**

**1. Each Question will carry 5 Marks**

**2. Instruction: Select the correct option(s)**

Q 1	For what value of $x$ , $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 1 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = 0$	CO1
	A. -2 B. 2 C. 4 D. None of these	
Q 2	The value of $2 \log\left(\frac{15}{18}\right) - \log\left(\frac{25}{162}\right) + \log\left(\frac{4}{9}\right)$ is	CO1
	A. 0 B. $\log 2$ C. $\log 3$ D. None of these	
Q 3	The relation that must exist between $x$ and $y$ so that $(x, y)$ is equidistant from $(6, -1)$ and $(2, 3)$ is	CO2
	A. $x + y = 2$ B. $y - x = 5$ C. $x - y = 3$ D. None of these	
Q 4	The value of $\lim_{x \rightarrow 0} \frac{\sqrt{1+3x} - \sqrt{1-3x}}{x}$ is	CO3
	A. 1 B. 2 C. 3 D. None of these	
Q 5	If $\phi(y) = y^3 + y^{\frac{3}{2}} + 2y^{\frac{1}{2}}$ , then the value of $\phi'(1)$ is	CO3
	A. $\frac{10}{2}$ B. $\frac{11}{2}$ C. $\frac{13}{2}$ D. None of these	
Q 6	The general solution of the differential equation $\frac{dy}{dx} = \frac{x+1}{2-y}$ , ( $y \neq 2$ ) is	CO3
	A. $x^2 + y^2 + 2x - 4y + C = 0$ B. $x^2 + y^2 - 2x + 4y + C = 0$ C. $x^2 - y^2 + 2x - 4y + C = 0$ D. None of these	

<b>SECTION – B</b>		<b>10 x 5 = 50 Marks</b>
<p><b>1. Each question will carry 10 marks</b></p> <p><b>2. Instruction: Answer on a separate white sheet, upload the solution as image.</b></p>		
Q 7	<p>In a certain city, there are 50 colleges and 400 schools. Each school and college have 18 peons, 5 clerks and 1 cashier. Each college in addition has 1 section officer and 1 librarian. The monthly salary of each of them is as follows:</p> <p>Peon: Rs. 1200, Clerk: Rs. 2000, Cashier: Rs. 2400, Section officer: Rs. 2800, Librarian: Rs. 3600. Using matrix notation, find (i) total number of posts of each kind in schools and colleges taken together. (ii) The total monthly salary bill of all schools and colleges taken together.</p>	CO4
Q 8	<p>Evaluate the following integrals</p> <p>(a) <math>\int \frac{x^3}{1+x^4} dx</math>                      (b) <math>\int x \sin x dx</math></p>	CO3
Q 9	<p>Solve the following system of equations using Cramer's rule.</p> $x - 3y + z = 2, 3x + y + z = 6, 5x + y + 3z = 3$	CO1
Q10	<p>Define exact differential equation. Show that the following equation is exact and hence solve it.</p> $(y^2 - 2x)dx + (2xy + 1)dy = 0$	CO3
Q 11	<p>(a) Find the area of the rectangle whose vertices are <math>(-2, 5)</math>, <math>(8, 5)</math>, <math>(8, -2)</math> and <math>(-2, -2)</math>.</p> <p>(b) Find the equation of the straight line joining the points <math>A = (2, 4)</math> and <math>B = (-3, 1)</math>.</p>	CO2
<b>Section – C</b>		<b>1 x 20 = 20 Marks</b>
<p><b>1. Each Question carries 20 Marks.</b></p> <p><b>2. Instruction: Answer on a separate white sheet, upload the solution as image.</b></p>		
Q 12	<p><b>A:</b> State Cayley-Hamilton theorem. Verify Cayley-Hamilton theorem for the matrix <math>A = \begin{bmatrix} 1 &amp; -1 \\ -6 &amp; -2 \end{bmatrix}</math>.</p> <p><b>B:</b> Resolve the following into partial fractions.</p> $\frac{x^2 + 1}{(x - 1)^2(x + 3)}$ <p style="text-align: center;"><b>(OR)</b></p> <p><b>A:</b> Use matrix inversion method to solve the system of equations given by <math>3x + 5y - 4z = 6,000, 2x - 3y + z = 5,000, -x + 4y + 6z = 13,000</math>.</p> <p><b>B:</b> If 'x' is an integer then solve <math>(\log_2 x)^2 - \log_2 x^4 - 32 = 0</math>.</p>	CO1