| Name: <br> Enrolment No: |  | TMUT |  |
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| UNIVERSITY OF PETROLEUM AND ENERGY STUDIES  <br> End Semester Examination, December 2022  <br> Course: Remedial Mathematics  <br> Semester : I <br> Program: Int. BMSC Microbiology/N \&D/Clinical Research, <br> BT Biomedical/Biotechnical, <br> B.Sc. FND/Microbiology/Clinical Research  <br> Course Code: BP106RMT  <br> Instructions: All questions are compulsory  |  |  |  |
| S. No. | Section A <br> Short answer questions/ MCQ/T\&F $\text { (20Qx1.5M= } 30 \text { Marks) }$ | Marks | COs |
| Q 1 | If $A=\left[\begin{array}{cc}2 & 4 \\ a & -5 \\ 3 & d\end{array}\right]$ and $B=\left[\begin{array}{cc}2 & b \\ 1 & -c \\ 3 & 2\end{array}\right]$ are equal, then the value of $a, b, c, d$ is: <br> a. $\quad a=1, b=4, c=5, d=2$ <br> b. $\quad a=1, b=4, c=-5, d=2$ <br> c. $a=1, b=4, c=5, d=-2$ <br> d. $a=-1, b=4, c=5, d=2$ | 1.5 | CO1 |
| Q2. | A matrix contains 48 elements then which of the following cannot be the number of rows: <br> a. 16 <br> b. 18 <br> c. 8 <br> d. 24 | 1.5 | CO1 |
| Q3. | Find the cofactor of 3 in the matrix $A=\left(\begin{array}{ccc}2 & 5 & -6 \\ 4 & 3 & 0 \\ 1 & 0 & -2\end{array}\right)$ | 1.5 | CO1 |
| Q4. | For matrices $A=\left(\begin{array}{cc}2 & -3 \\ 0 & 2 \\ 7 & -2\end{array}\right)$ and $B=\left(\begin{array}{ccc}1 & -2 & 0 \\ 5 & 1 & 2\end{array}\right)$, which of the following is the matrix $3\left(A^{T}+2 B\right)$ ? <br> a. $\left(\begin{array}{ccc}12 & 12 & 21 \\ 21 & -12 & -6\end{array}\right)$ <br> b. $\left(\begin{array}{cc}4 & 7 \\ -4 & 4 \\ 7 & 2\end{array}\right)$ | 1.5 | CO1 |


|  | c. $\left(\begin{array}{ccc}12 & -12 & 21 \\ 21 & 12 & 6\end{array}\right)$ <br> d. The matrix is undefined |  |  |
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| Q5. | The value of resultant matrix multiplication $\left(\begin{array}{lll}7 & 5 & 3\end{array}\right)\left(\begin{array}{l}7 \\ 3 \\ 2\end{array}\right)$ is: <br> a. 70 <br> b. 49 <br> c. 15 <br> d. 6 | 1.5 | CO1 |
| Q6. | Two lines $3 x-y+4=0$ and $a x+2 y-3=0$ are parallel, then $a$ is equal to: <br> a. -3 <br> b. -6 <br> c. -0.5 <br> d. 3 | 1.5 | CO2 |
| Q7. | Which point is on the line $3 x-5 y-9=0$ <br> a. $(-4,-1)$ <br> b. $(1,-2)$ <br> c. $(-3,-2)$ <br> d. $(-2,-3)$ | 1.5 | CO2 |
| Q8. | Which line is parallel to the line $x-6=0$ ? <br> a. $x=-2$ <br> b. $y=5$ <br> c. $y=2 x+3$ <br> d. $y-1=0$ | 1.5 | CO2 |
| Q9. | What is the $y$ intercept of the line $5 x-3 y+30=0$ ? | 1.5 | CO2 |
| Q10. | What is the slope of the line $-5 x+8 y-2=0$ ? | 1.5 | CO2 |
| Q11. | If $f(x)=\operatorname{loge} e^{\tan x}$ then $f^{\prime}(x)=$ ? | 1.5 | CO3 |
| Q12. | Second derivative of $\cos x$ is given by: <br> a. $-\sin x$ <br> b. $\sin x$ <br> c. $\cos x$ <br> d. $-\cos x$ | 1.5 | CO3 |
| Q13. | If $x=\sin \theta, y=\cos \theta$, then $\frac{d y}{d x}=$ ? | 1.5 | CO3 |
| Q14. | Evaluate $I=\int\left(x^{2}+\frac{2}{x^{3}}-7\right) d x$ | 1.5 | CO3 |
| Q15. | $\int 4^{x} d x=?$ <br> a. $4^{x} \log 4+c$ <br> b. $\frac{4^{x}}{\log 4}+c$ <br> c. $\frac{4^{x+1}}{x+1}+c$ <br> d. none | 1.5 | CO3 |
| Q16. | Laplace transform of t. sinat is given by: | 1.5 | CO3 |


|  | a. $\frac{2 s}{\left(s^{2}-a^{2}\right)}$ <br> b. $\frac{2 s}{\left(s^{2}+a^{2}\right)}$ <br> c. $\frac{2 a s}{\left(s^{2}+a^{2}\right)}$ <br> d. $\frac{2}{\left(s^{2}+a^{2}\right)}$ |  |  |
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|  | In a culture, bacteria increase at the rate proportional to the number of bacteria present. If there are 200 bacteria initially and are doubled in 4 hours, find the number of bacteria present 9 hours later. $\left(2^{\frac{9}{4}}=4.76\right)$ |  |  |
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| Q 2 | Evaluate the integral $I$ using the method of partial fractions $I=\int \frac{3 x-2}{(x-1)^{2}(x+3)} d x$ | 15 | CO 3 |
|  | $\begin{gathered} \text { Section D } \\ \text { (2Qx10M=20 Marks) } \end{gathered}$ |  |  |
| Q 1 | Find the ratio in which the line $3 x+y-9=0$ divides the line segment joining $A(1,3)$ and $B(2,7)$. | 10 | CO2 |
| Q 2 | Without expanding the determinant show that $\left\|\begin{array}{lll} b+c & b c & b^{2} c^{2} \\ c+a & c a & c^{2} a^{2} \\ a+b & a b & a^{2} b^{2} \end{array}\right\|=0$ <br> OR <br> Determine whether the matrix $A$ is invertible or not. If it is invertible then apply adjoint method to find the inverse of matrix $A$ : $\mathrm{A}=\left[\begin{array}{ccc} 2 & 6 & 3 \\ 4 & -1 & 3 \\ 1 & 3 & 2 \end{array}\right]$ | 10 | CO1 |

