Enrollment No:-__________ Exam Seat No:-_______

C.U.SHAH UNIVERSITY

Summer-2015

Subject Code: 4TE02EMT1 **Subject Name: Engineering Mathematics-II**
Course Name: B.Tech Date: 18/5/2015
Semester:II Marks:70
Time:02:30 TO 05:30

Instructions:

1) Attempt all Questions in same answer book/Supplementary.
2) Use of Programmable calculator & any other electronic instrument prohibited.
3) Instructions written on main answer book are strictly to be obeyed.
4) Draw neat diagrams & figures (if necessary) at right places.
5) Assume suitable & perfect data if needed.

Q-1 (a) If $A=\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & -1 & 3 \end{bmatrix}$ Then find the value of $\det A$. [02]

(b) Solve: $x\dfrac{dx}{dy}+y=0$. [02]

(c) Find order and degree of $\dfrac{dy}{dx}=\dfrac{x}{\dfrac{dy}{dx}}$ [02]

(d) Solve: $\int\limits_0^1\int\limits_0^2 xy\ dxdy$. [02]

(e) Evaluate using improper integrals $\int\limits_0^\infty \dfrac{1}{1+x^2}dx$. [02]

(f) If $\overline{A}=x^2z\hat{i}-2y^3z^2\,\hat{j}+xy^2z\,\hat{k}$,find $\nabla\cdot\overline{A}$ at point $(1,-1,1)$. [02]

(g) Define: Symmetric matrix and Square matrix. [02]

Attempt any four: (From Q-2 to Q-8)

Q-2 (a) Define: Exact differential equation and Solve $\left[(x+1)e^x-e^y\right]dx-xe^y dy=0,\quad y(1)=0$. [05]

(b) Find the A^{-1} by determinant method $A=\begin{bmatrix} 1 & 2 & 1 \\ 0 & 2 & 2 \\ 2 & 1 & 1 \end{bmatrix}$. [05]

(c) Evaluate $\iint\limits_R xy\,dy\,dx$ Where R is the positive quadrant of the circle $x^2+y^2=a^2$. [04]

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Q-3 (a) Solve: $\frac{dy}{dx}+6x^2y=\frac{e^{-2x^3}}{x^2}$, where $y(1)=0$. [05]

(b) Find the Eigenvalue and Eigenvector of the Matrix $A=\begin{bmatrix}2 & 2 & 1\\ 1 & 3 & 1\\ 1 & 2 & 2\end{bmatrix}$. [05]

(c) Find the rank of following matrix by reduce to normal form A= $\begin{bmatrix}1 & 2 & -1 & 3\\ 3 & 4 & 0 & -1\\ -1 & 0 & -2 & 7\end{bmatrix}$. [04]

Q-4 (a) Evaluate $\iint_R (x^2+y^2)\,dA$,by changing the variables, where R is the region lying in the first quadrant and bounded by the hyperbolas $x^2-y^2=1, x^2-y^2=9, xy=2$ and $xy=4$. [05]

(b) Verify Green's theorem for $\oint_C (x^2-2xy)dx+(x^2y+3)dy$ where C is the boundary of the region bounded by the parabola $y=x^2$ and line $y=x$. [05]

(c) Evaluate $\int_C \bar{F}\cdot d\bar{r}$ along the parabola $y^2=x$ between the points $(0,0)$ and $(1,1)$ where $\bar{F}=x^2\hat{i}+xy\hat{j}$ [04]

Q-5 (a) Verify Cayley Hamilton theorem for $A=\begin{bmatrix}1 & 4\\ 2 & 3\end{bmatrix}$ and hence find the value of $A^5+5A^4-6A^3+2A^2-4A+7I$. [05]

(b) Find $curl\, curl\, \bar{A}$ if $\bar{A}=x^2y\hat{i}-2xz\hat{j}+2yz\hat{k}$ at the point $(1,0,2)$. [05]

(c) Check the convergence of $\int_4^{\infty}\frac{3x+5}{x^4+7}dx$ [04]

Q-6 (a) Find the Work done in moving a particular in the force field $\bar{F}=3x^2\hat{i}+(2xz-y)\hat{j}+z\hat{k}$ along the curve $x^2=4y$ and $3x^3=8z$ from $x=0$ to $x=2$. [05]

(b) Express the matrix $A=\begin{bmatrix}1 & 5 & 7\\ -1 & -2 & -4\\ 8 & 2 & 13\end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix. [05]

(c) Evaluate: $\int_{0}^{\frac{1}{2}} x^3\sqrt{1-4x^2}\,dx$. [04]

Q-7 (a) Solve: $\frac{dy}{dx}+\frac{1}{x}y=x^2y^6$ [05]

(b) Find the A^{-1} of the following matrix by Gauss-Jordan method where $A=\begin{bmatrix} 2 & 3 & 4 \\ 4 & 3 & 1 \\ 1 & 2 & 4 \end{bmatrix}$. [05]

(c) Form the differential equation of $y=Ae^{2x}+Be^{3x}$. [04]

Q-8 (a) Evaluate: $\int_{0}^{1}\int_{0}^{\sqrt{1-x^2}}\int_{0}^{\sqrt{1-x^2-y^2}} xyz\ dzdydx$ [05]

(b) Find the value of μ which satisfy the equation of $A^{100}x=\mu x$, where

$A=\begin{bmatrix} 2 & 1 & -1 \\ 0 & -2 & -2 \\ 1 & 1 & 0 \end{bmatrix}$ [05]

(c) Evaluate: $\int_{-2\pi}^{2\pi} \sin^6 x\,dx$. [04]