ARYA COLLEGE OF ENGINEERING
IMPORTANT QUESTIONS
2FY2-01: ENGINEERING MATHEMATICS-I
BRANCH: Common to All

PART A

1	Solve $sinpx\ cosy = cospx\ siny + p$	**5*3**
2	State Rank-Nullity Theorem. Hence find the nullity of $\begin{bmatrix} 5 & 3 & 14 & 4 \\ 0 & 1 & 2 & 1 \\ 1 & -1 & 2 & 0 \end{bmatrix}$	
3	If $A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & 3 & 2 \\ 0 & 0 & -2 \end{bmatrix}$ then find the eigenvalues of $3A^3 + 5A^2 - 6A + 2I$..	
4	Are the following vectors linearly independent? $x_1 = (1,1,1,3), x_2 = (1,2,3,4), x_3 = (2,3,4,9)$	
5	Define Bernoulli's equation and Clairaut's equation	
6	Define Null space & write Rank Nullity Theorem	
7	Suppose the system AX=B is consistent & A is 5*8 matrix & rank (A) =3 How many parameters does the solution of the system have?	
8	Determine the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 1 & 6 & 5 \end{bmatrix}$	
9	Solve $P^2 - 7p + 12 = 0$	
10	State Cayley Hamilton Theorem.	
11	Find integrating factor for the following equation: - $x\ logx\frac{dy}{dx}$+ y + 2 $logx$	
12	find the rank of matrix $\begin{bmatrix} -1 & 2 & 3 & -2 \\ 2 & -5 & 1 & 2 \\ 3 & -8 & 5 & 2 \\ 5 & -12 & -1 & 6 \end{bmatrix}$	
13	Solve the equation :- $p^2 + p(x+y) + xy = 0$	
14	**Solve :** $(e^y + 1)\cos x\ dx + e^y \sin x\ dx = 0$	
15	Define symmetric and skew symmetric matrix with example .	
16	Solve : $(y - px)(p - 1) = p$	

PART B

1	Reduce the matrix $A = \begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ in its normal form and hence find the rank	**4*6**
2	For what values of μ and β the system of equations 2x+3y+5z=9, 7x+3y-2z=8,	

	2x+3y+βz = μ have i) No Solution , ii) Unique Solution and iii)Infinite many solution.
3	Define integrating factor and hence write the integrating factor of i) $(xy\,sinxy + cosxy)ydx + (xysinxy - cosxy)xdy$ ii) $(x^3e^x - my^2)\,dx + mxydy = 0$
4	Solve $(1+y^2)dx = (tan^{-1}y - x)dy$
5	Solve $\left[y\left\{1+\frac{1}{x}\right\} + cosy\right]dx + [x + logx - xsiny]dy = 0$
6	Solve $\frac{dy}{dx} + \frac{y}{x}logy = \frac{y}{x^2}(logy)^2$
7	Solve ; $(1+y^2) + \left(x - e^{-\tan^{-1}y}\right)\frac{dy}{dx} = 0$
8	For what values of K, the equations $x + y + z = 1$ $2x + y + 4z = K$ $4x + 1y + 10z = K^2$ Have solution & solve them completely in each case.
9	Are the following vectors linearly dependent? If so, express, these as a linear combination form. $X_1(1,1,1,3)$; $X_2 = (1,2,3,4)$; X_3 =(2,3,4,9)
10	Solve $\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right)dy = 0$
11	Solve $y = 2px - p^2$
12	Solve $p^2 + 2py\,cotx = y^2$.
13	For what values of k the equations $x + y + z = 1,\ 2x + y + 4z = k,\ 4x + y + 10z = k^2$ have a solution and solve them completely in each case.
14	Are the following vectors linearly dependent? If so express one of these as a linear combination of other two: $x_1 = (1,3,4,2), x_2 = (3,-5,2,2), x_3 = (2,-1,3,2)$
15	solve $\frac{dy}{dx} = \frac{1}{xy\,(x^2y^2+1)}$
16	Solve :
17	Solve : $x^2(y - px) = yp^2$

PART C

1	State Cayley- Hamilton Theorem. Find A^{-1} for A= $\begin{bmatrix}2 & 1 & 1\\ 0 & 1 & 0\\ 1 & 1 & 2\end{bmatrix}$ by using this theorem. Also find the matrix represented as $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$	**2*10.5**
2	Diagonalise the matrix $\begin{bmatrix}8 & -6 & 2\\ -6 & 7 & -4\\ 2 & -4 & 3\end{bmatrix}$.	

3	Solve: $(x^4y^4 + x^2y^2 + xy)y\,dx + (x^4y^4 - x^2y^2 + xy)x\,dy = 0$
4	Verify cayley Hamilton theorem for matrix. $A=\begin{bmatrix}0 & 1 & 2\\ 1 & 2 & 3\\ 3 & 1 & 1\end{bmatrix}$
5	Examine Whether the matrix. $A = \begin{bmatrix}-2 & 2 & -3\\ 2 & 1 & -6\\ -1 & -2 & 0\end{bmatrix}$ is diagonalizable. If so obtain the matrix P such that P^{-1} AP is a diagonal matrix.
6	Solve the following differential equation. $(x^4y^4 + x^2y^2 + xy)y\,dx + (x^4y^4 - x^2y^2 + xy)x\,dy = 0$
7	Find eigen values and eigen vectors of the matrix $A=\begin{bmatrix}-2 & 1 & 1\\ -11 & 4 & 5\\ -1 & 1 & 0\end{bmatrix}$
8	Solve the following: - i) $p^2 + 2px - 3x^2 = 0$
9	Find a similarity transformation which will reduce the matrix to diagonal matrix. $A = \begin{bmatrix}2 & -3 & 3\\ 0 & 3 & -1\\ 0 & -1 & 3\end{bmatrix}$
10	Find the Eigen values and Eigen vectors of the following matrices $\begin{bmatrix}2 & -1 & 1\\ -1 & 2 & -1\\ 1 & -1 & 2\end{bmatrix}$. Verify cayley Hamilton theorem for it and find A^{-1}.
11	solve : $(3x + 2y^2)ydx + 2x(2x + 3y^2)dy = 0$