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**MLR15**

 **Code No: A10009**

**MLR INSTITUTE OF TECHNOLOGY**
(An Autonomous Institution)
B.Tech I Year II Sem Examinations- June-2016

**MATHEMATICS-II**(Common to All Branches)

Time : 3 hours Max.Marks :75

Note: 1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 25 marks. Answer all Questions in part A.
 3. Part B consists of 5 units. Answer any one full question from each unit. Each question carries 10
 Marks and may have a,b,c as sub questions.

 **PART-A**  **25 Marks**

1. a) State Cayley- Hamilton theorem 2M

b) Find Eigen values of the matrix A= 2M

c) Form the partial differential equation by eliminating the arbitrary function “f” from

 $z=f(x^{2}-y^{2})$ 2M

 d) Find the Fourier coefficient for f(x) =x in (-π, π) 2M

 e) Find the finite Fourier sine transform of f(x) defined by f(x) =x where 0<x<4 2M

2. a) Find the rank of the matrix A by reducing it to the normal form where
 A=  3M

 b) Identify the nature of the quadratic form 3M

c) Solve $p\tan(x)+q\tan(y)=\tan(z) $   3M

d) Expand the function f(x) =x2 as a Fourier series in [-π, π] 3M

e) Find $z^{-1}\left\{\frac{z}{\left(z+3\right)^{2}(z-2)}\right\}$ 3M
 **PART-B 5x10=50** Marks

3. a) Find the inverse of the matrix A using Gauss-Jordan method A= 5M

b) Find the whether the following system of equations are consistent. If so solve them

 $x+2y+2z=2,$ $3x-2y-z=5, $ $2x-5y+3z=-4,$ $x+4y+6z=0$ 5M

 **OR**

4. a) Solve the equations    using
 Gauss- Elimination method. 5M

b) Verify Cayley- Hamilton theorem for the matrix A= and hence find A-1 5M

5. a) Find Eigen values and Eigen vectors of the matrix A= 5M

b) Reduce the Quadratic form  to canonical form by orthogonal transformation. 5M

**OR**

6. a) Prove that Eigen values of a Hermitian matrix are real 5M

 b) Diagonalize the matrix A= 5M

7. a) Form the partial differential equation by eliminating the arbitrary function from
 z=y f(x2+z2) 5M

 b) Solve  5M

**OR**

8. a) Solve  5M

 b) Solve $\frac{∂u}{∂x}=2\frac{∂u}{∂t}+u $ where u(x, 0) =6e-3x by the method of separation of variables 5M

9. a) Find the Fourier series of the function  in $0\leq x\leq 3$ 5M

 b) Find the half range cosine series and sine series for f(x) =x in 0<x< π and hence deduce that $\frac{1}{1^{2}}+\frac{1}{3^{2}}+\frac{1}{5^{2}}+,…..=\frac{π^{2}}{8}$ 5M

**OR**

10. a) Find the half-range sine series for $f\left(x\right)=x\left(π-x\right) in 0\leq x\leq π$ 5M

 b) Find the half-range cosine series for $f\left(x\right)=x(2-x) $in $0\leq x\leq 2$ and hence find the sum of the series $\frac{1}{1^{2}}-\frac{1}{2^{2}}+\frac{1}{3^{2}}-\frac{1}{4^{2}}+,…..$ 5M

11. a) Find the Fourier transform of f(x) defined by $f\left(x\right)=\left\{\begin{array}{c}1-x^{2},if \left|\left.x\right|\leq 1\right.\\0 ,if \left|\left.x\right|\geq 1\right.\end{array}\right.$ 5M

 b) Find the Infinite Fourier sine transform of $f(x)=\frac{1}{x(x^{2}+a^{2})}$ 5M

**OR**

12. a) Find $Z^{-1}\left[\frac{4z^{2}-2z}{z^{3}-5z^{2}+8z-4}\right]$ 5M

 b) Solve the difference equation using Z- transform where  5M

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