APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY

08 PALAKKAD CLUSTER

6211_D16_1 **(Pages: 3)** **Name** ....

Reg. No:..............................

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DECEMBER 2016

Branch: Electrical &Electronics Engineering **Specialization: Power Electronics**

08EE6211 APPLIED MATHEMATICS

Time:3 hours **Max Marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q.no.	Module 1	Marks
1.a	Find the Eigen values and Eigen Vectors of the Matrix A = $\begin{matrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{matrix}$	3
	Answer b or c	
b	A Fluid motion is given by V = (y+z) I + (z + x) J + (x + y) K. Is this motion Irrotational ? If so find Velocity Potential. Is this motion possible for an Incompressible fluid?	6
c	Verify Divergence theorem for F = $(x^2 - yz)$ I + $(y^2 - xz)$ J + $(z^2 - xy)$ K taken over the rectangular parallelepiped $0 \le x \le a$, $0 \le y \le b$, $0 \le z \le c$.	6

Q.no.	Module 2	Marks
2.a	Solve y (log y) dx + (x—log y) dy =0	3
	Answer b or c	
b	Find the complete solution of y" – 2y' + 2y = x + e^x cos x	6
c	Solve $x^2 \frac{d^2y}{dx^2} + 3x \frac{dy}{dx} + 2y = e^x$	6

Q.no.	Module 3	Marks
3.a	Find the Fourier Cosine transform of : { " x " , for $0 < x < 1$ " $2 - x$" for $1` < x < 2$ and " 0 " for $x > 2$	3
	Answer b or c	
b	Obtain Fourier Series for the function $f(x) = \pi x$, $0 \le x \le 1$ $\pi(2 - x)$ $1 \le x \le 2$	6
c	Find Fourier Series for the expansion of f (x) = 2 x - x^2 in (0 ,3) and hence deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots\ldots\ldots\ldots - \infty = \frac{\pi}{12}$	6

Q.no.	Module 4	Marks
4.a	Derive Polar Form of Cauchy Riemann Equations ?	3
	Answer b or c	
b	Find the conjugate harmonic of $v(r, \theta) = r^2 \cos 2\theta - r \cos\theta + 2$. Show that v is Harmonic?	6
c	Find the Residue of $f(z) = \frac{z^3}{(z-1)^4 (z-2)(z-3)}$ at it's Poles hence evaluate closed $\int f(z)\,dz$ where C is the circle $\lvert z \rvert = 2.5$	6

Q.no.	Module 5	Marks
5.a	State and prove Cauchy's Inequality ?	4
	Answer b or c	
b	Prove that the function f (z) defined by $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2+y^2}$ $(z \neq 0)$ $f(0) = 0$ is continuous and the Cauchy Riemann equations are satisfied at the origin yet f '(0) does not exist .	8
c	Find the Laurent's expansion of $f(z) = \frac{(7z - 2)}{(z+1)(z+2)}$ in the region $1 < z + 1 < 3$	8

Q.no.	Module 6	Marks
6.a	Find the Maximum value of $z = 2x + 3y$ subject to the constraints : $x + y \leq 30$, $y \geq 3$, $0 \leq y \leq 12$.	4
	Answer b or c	
b	Maximize $Z = 2x_1 + 2x_2$ subject to the constraints $5x_1 + 3x_2 \leq 8$, $5x_1 + 2x_2 \geq 8$, and $x_1 , x_2 \geq 0$	8
c	Maximize $Z = 2x + 3y$ subject to the constraints $2x + 3y \leq 7$, $x \leq 2$,, $y \leq 2$ and $x , y \geq 0$.	8