

**APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER**

6211-17Dec-1

(Pages: 3)

Name:

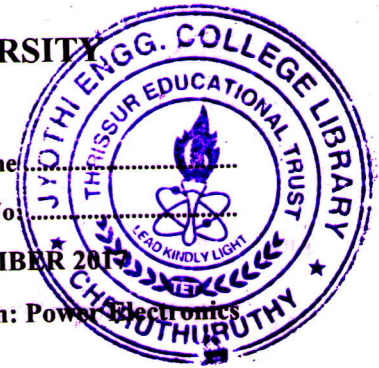
Reg. No:

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DECEMBER 2017

Branch: Electrical Engineering

Specialization: Power Electronics

08EE 6211 APPLIED MATHEMATICS



Time: 3 hours

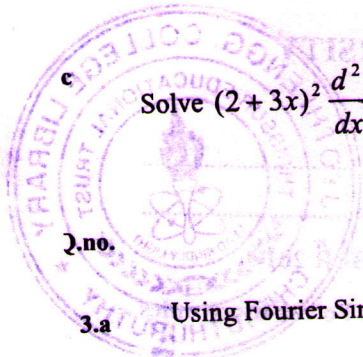
Max. marks: 60

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	<p>If 2 is an eigen value of $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$, without using its characteristic equation, find the other eigenvalues. Also find the eigenvalues of $A^3, A^T, A^{-1}, 3A$</p> <p align="center">Answer b or c</p>	3
b	<p>(i) Prove that $T: V_2(\mathbb{R}) \rightarrow V_3(\mathbb{R})$ such that $T(a,b) = (a+b, a-b, a)$ is a linear transformation from V_2 to V_3</p> <p>(ii) Find the symmetric matrix associated with the quadratic form $-3x^2 - 3y^2 - 3z^2 - 2xz - 2xy + 2yz$ and find the eigen values of the matrix.</p>	3
c	<p>Examine whether the matrix $A = \begin{bmatrix} 1 & -3 & 3 \\ 0 & -5 & 6 \\ 0 & -3 & 4 \end{bmatrix}$ is diagonalizable. If yes find a matrix which diagonalises A</p>	6

Q.no.	Module 2	Marks
2.a	<p>Solve $\frac{dy}{dx} + \tan x \tan y = \cos x \sec y$</p> <p align="center">Answer b or c</p>	3
b	<p>Solve $x^2 \frac{d^2y}{dx^2} + 5x \frac{dy}{dx} + 3y = \frac{\log x}{x^2}$</p>	6



c. Solve $(2+3x)^2 \frac{d^2y}{dx^2} + 3(2+3x) \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$

6

Module 3

Marks

Q.no.

3.a

Using Fourier Sine transform of $e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{w \sin wx}{1+w^2} dw$

3

Answer b or c

b. Find Fourier transform of $f(x) = \begin{cases} 1-|x|, & |x| < 1 \\ 0, & \text{otherwise} \end{cases}$ and hence evaluate

6

$\int_0^\infty \left(\frac{1-\cos x}{x^2} \right) dx$

c. Obtain the half range Fourier cosine series for $f(x) = 2x - 1, 0 < x < 1$. Hence

6

deduce the value of $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$

Module 4

Marks

Q.no.

4.a.

Expand $f(z) = \frac{1}{z+2}$ as a Taylor's series about the point $z = 3$

3

Answer b or c

b. Using Cauchy's Integral formula evaluate $\int_C \frac{z^2}{(z-6)^2(z+1)} dz$ where C is $|z-2| = 3.5$

6

c. If $u = \frac{\sin 2x}{\cosh 2y + \cos 2x}$ then find the analytic function $f(z)$.

6

Module 5

Marks

Q.no.

5.a.

What is the residue of $\frac{1}{\sin^2 z}$ at $z = 0$

4

Answer b or c

b. Show that $\int_0^{2\pi} \frac{\cos 2\theta}{1-2a \cos \theta + a^2} d\theta = \frac{2\pi a^2}{1-a^2}, 0 < a^2 < 1$

8

c. Discuss the mapping $w = \cosh z$. Also find the images of lines parallel to X and Y axis in Z plane.

8

Q.no.

Module 6

Marks

6.a. Minimize $f(x,y) = kx^{-1}y^{-2}$ subject to the conditions $g(x,y) = x^2 + y^2 - a^2 = 0$

4

Answer b or c

b. Use branch and bound method to solve the following LPP.

8

Maximize $z = 7x_1 + 9x_2$ subject to the constraints $-x_1 + 3x_2 \leq 6$, $7x_1 + x_2 \leq 35$, $x_1 \leq 7$, $x_1, x_2 \geq 0$ and are integers

c. Solve the following linear programming problem by Gomory technique.

8

Maximize $Z = 3x_2$ subject to the constraints $3x_1 + 2x_2 \leq 7$, $-x_1 + x_2 \leq 2$, x_1, x_2 are ≥ 0 and are integers