

APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY

08 PALAKKAD CLUSTER

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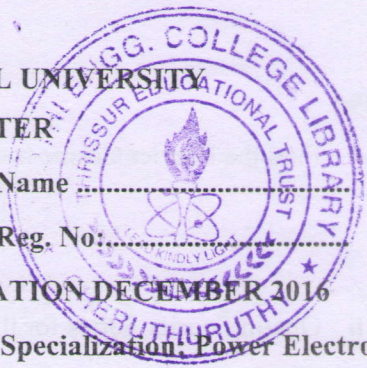
Name

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 $A = \begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$	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 $0 \leq x \leq a, 0 \leq y \leq b, 0 \leq z \leq c$. 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 $x^2 \frac{d^2 y}{dx^2} + 3x \frac{dy}{dx} + 2y = e^x$ 6

Q.no. **Module 3** **Marks**

- 3.a** Find the Fourier Cosine transform of : { “ x “ , for $0 < x < 1$ 3
“ 2 - x ” for $1 < x < 2$ and “ 0 “ for $x > 2$

Answer b or c

- b** Obtain Fourier Series for the function $f(x) = \pi x$, $0 \leq x \leq 1$ 6
 $\pi (2 - x)$ $1 \leq x \leq 2$

- c** Find Fourier Series for the expansion of $f(x) = 2x - x^2$ in $(0, 3)$ and hence deduce that 6

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots - \infty = \frac{\pi}{12}$$

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 $f(z) = \frac{z^3}{(z-1)^2(z-2)(z-3)}$ at it's Poles hence evaluate closed 6
 $\int f(z) dz$ where C is the circle $|z| = 2.5$

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 $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}$ ($z \neq 0$) $f(0) = 0$ 8
is continuous and the Cauchy Riemann equations are satisfied at the origin yet $f'(0)$ does not exist.

- 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**