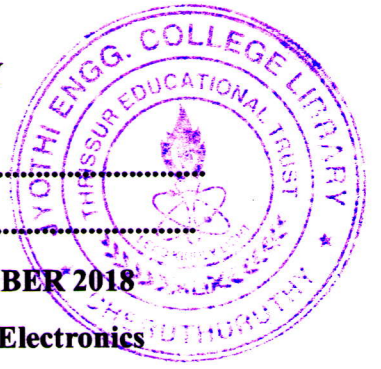


APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER



Q. P. Code : PE0821118

(Pages: 3)

Name

Reg. No:

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DECEMBER 2018

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.

(Add any other instruction specific to course here like the use of IS codes/design tables etc.)

Note: The 3 and 4 mark sub questions are compulsory for testing the knowledge on fundamental aspects. However 6 and 8 mark sub questions shall preferably be application type questions with the choice to answer any one.)

Q.no.	Module 1	Marks
1.a	Test for consistency the following equations and solve them if consistent? $2y + 3t = 2$; $2x + y + z + t = (-) 4$; $4x - 3y + z + 7t = 8$	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

P.T.O

Q.no. **Module 2** **Marks**

2.a Solve $x \frac{dy}{dx} + y = x^3 y^6$ **3**

Answer b or c

b Solve $(D^4 + 2D^2 + 1)y = x^2 \cos x$ **6**

c Solve $(1+x)^2 \frac{d^2 y}{dx^2} + (1+x) \frac{dy}{dx} + y = 2 \sin \log(1+x)$ **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 If $f(x) = |\cos x|$, expand $f(x)$ as a Fourier series in the interval $(-\pi, \pi)$ **6**

Q.no. **Module 4** **Marks**

4.a Evaluate $\oint \frac{(\sin \pi z^2 + \cos \pi z^2)}{(z-1)(z-2)} dz$ along C , where C is the circle $|z| = 3$ **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 $|z| = 2.5$ **6**

P.T.O

Q.no.	Module 5	Marks
5.a	Find the Bilinear transformation which maps the points $z = 1, i, -i$ onto the points $w = i, 0, -i$. Hence find the image of $ z = 1$, the Invariant points of this transform ?	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 : $x + y \leq 30$, $y \geq 3$, $0 \leq x \leq 12$.	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