



APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY  
08 PALAKKAD CLUSTER

Q. P. Code : PE0820111-I

(Pages: 2)

Name: .....

Reg. No: .....

FIRST SEMESTER M.TECH. DEGREE EXAMINATION MARCH 2021

Branch: Electrical and Electronics Engineering

Specialization: Power Electronics

08EE6211 APPLIED MATHEMATICS

Time: 2 hour 15 minutes

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	Determine whether the polynomial $P(x) = 1 + 2x + 3x^2$ is a linear combination of the polynomials $P_1(x) = -2 + x$ , $P_2(x) = 2x + x^2$ , $P_3(x) = 1 - x - x^2$	3
<b>Answer b or c</b>		
b	Find the eigen values and eigen vectors of $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$	6
c	Let W be the subspace of $\mathbb{R}^4$ spanned by $x_1 = (1, 2, 1, -2)$ , $x_2 = (2, 3, 2, -3)$ and $x_3 = (2, 5, 2, -5)$ . Find a basis for W and the dimension of W.	6

Q.no.	Module 2	Marks
2.a	Solve the differential equation $(\sin y + y \cos y) dy = x(2 \log x + 1) dx$ .	3
<b>Answer b or c</b>		
b	Determine the overall solution of the differential equation given below. $(1 + x)^2 \frac{d^2 y}{dx^2} + (1 + x) \frac{dy}{dx} + y = 2 \sin \log(1 + x)$ .	6
c	Solve the differential equation $x^2 \frac{d^2 y}{dx^2} + 4x \frac{dy}{dx} + 2y = e^x$ .	6

Q.no.	Module 3	Marks
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3.a	State dirichlet's condition for the existence of fourier series with examples	3
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**Answer b or c**

b	Find the fourier series to represent $x - x^2$ from $-\pi$ to $\pi$	6
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c	Express $f(x)=1$ for $0 \leq x \leq \pi$	6
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0 for  $x > \pi$  as fourier sine integral and hence evaluate

$$\int_0^\infty \frac{1 - \cos \lambda \pi}{\lambda} \sin \lambda x \, d\lambda$$

Q.no.	Module 4	Marks
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4.a	Show the polar form of Cauchy Riemann Equation	3
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**Answer b or c**

b	Integrate $f(z)=x^2 + ixy$ from A(1,1) to B(2,4) along $x=t$ and $y=t^2$	6
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c	State and prove Cauchy's integral theorem. Hence evaluate $\oint \frac{e^z}{(z^2+\pi^2)^2} dz$ over $ z =4$	6
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Q.no.	Module 5	Marks
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5.a	Find the Laurent's series expansion of $\frac{1}{z^3-z^4}$ with center 0	4
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**Answer b or c**

b	Using Cauchy's residue theorem evaluate $\oint \frac{30z^2-23z+5}{(2z-1)^2(3z-1)}$ where C is $ z =1$ .	8
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c	What is the image of the line $x=c$ under the transformation $w=\cos z$ . what is the image of the line $y=k$	8
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Q.no.	Module 6	Marks
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6.a	Give the different classification of optimization problems with examples.	4
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**Answer b or c**

b	Explain in detail Gomory cutting plane method for integer programming problems with an example.	8
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c	Use branch and bound method to solve the following LPP.	8
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Maximize  $z = 6x_1 + 8x_2$  subject to the constraints  $4x_1 + 16x_2 \leq 32$ ,  $14x_1 + 4x_2 \leq 28$ ,  $x_1, x_2 \geq 0$  and are integers