

APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER



Q. P. Code :PE0819211-II

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Name:

Reg. No:.....

FIRST SEMESTER M.TECH. DEGREE EXAMINATION December 2019

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.

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

Q.no. Module 1 Marks

1.a Prove that any set of vectors containing a zero vector is linearly dependent. 3

Answer b or c

b Let V be the set of all ordered 'n' tuples of scalars from a field F. check whether V forms a vector space over F. 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 $3 \frac{dy}{dx} + xy = \frac{x}{y^2}$. 3

Answer b or c

b Determine the overall solution of the differential equation given below. 6
 $(1+x)^2 \frac{d^2y}{dx^2} + (1+x) \frac{dy}{dx} + y = 2 \sin [\log(1+x)]$.

c Solve the differential equation $\frac{dy}{dx} - 2 \cos x \cot y + \sin^2 x \operatorname{cosec} y \cos x = 0$. 6

Q.no. Module 3 Marks

3.a State the conditions for the existence of Fourier series. 3

Answer b or c

- b Expand $f(x) = e^{-x}$ as Fourier series in the interval $0 < x < 2\pi$. 6
- c Find the Fourier sine transform of $e^{-|x|}$. Hence evaluate $\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx$, $m > 0$. 6

Q.no. Module 4 Marks

- 4.a If $w = \log z$, find $\frac{dw}{dz}$ and determine where w is non analytic. 3

Answer b or c

- b Derive the polar form of Cauchy Reimann equations. 6
- c Evaluate $\int_0^{1+i} (x^2 - iy) dz$ along the paths i) $y = x$ ii) $y = x^2$. 6

Q.no. Module 5 Marks

- 5.a Find the Laurent's series expansion of $\frac{1}{z-z^3}$ in $1 < |z+1| < 2$. 4

Answer b or c

- b State Cauchy's residue theorem and hence evaluate $\oint \frac{z-23}{z^2-4z-5} dz$ where C is $|z-2-i| = 3.5$. 8
- c Find the image of $0 < x < 1, \frac{1}{2} < y < 1$ under the mapping $w = e^z$. 8

Q.no. Module 6 Marks

- 6.a State the optimality criteria for single and multivariable functions. 4

Answer b or c

- b Explain sequential linear discrete programming problems with an example. 8
- c Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ using conjugate gradient method. 8