

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SECOND SEMESTER M.TECH DEGREE EXAMINATION, APRIL 2018
IN COMMUNICATION ENGINEERING & SIGNAL PROCESSING

07EC6258 ANTENNA THEORY AND DESIGN

Max. marks: 60

Time: 3 hours

Answer all six questions. Part 'a' of each question is compulsory

Answer either part 'b' or part 'c' of each question

Q.no.	Module 1	Marks
1a	Define magnetic vector potential from the divergence equation of magnetic field. How is the non-uniqueness of this definition of vector potential tackled in finding the radiation fields?	4
	Answer b or c	
b	State the conditions under which we can infer the properties of a receiving antenna from its properties as a transmitting antenna? What is meant by transfer impedance?	5
c	List the major steps to calculate electric field from a current element starting from Maxwells equations.	5
Q.no.	Module 2	Marks
2a	Compare the fields of small loop and short dipole.	4
	Answer b or c	
b	Assuming sinusoidal current distribution over a dipole and considering it as an array of elementary dipoles, write down expressions for (i) the current distribution (ii) the element factor and (iii) the space factor in integral form.	5
c	For half wave dipole antenna, draw the current distribution and radiation pattern. What are the values for HPBW and radiation resistance for half wave dipole antenna?	5
Q.no.	Module 3	Marks
3a	How a linear array can be formed with no side lobes? Give example with 4 elements.	4
	Answer b or c	
b	Find the array factor for linear uniformly spaced N element array of isotropic elements. How to find the radiation pattern of the array if the isotropic elements are replaced by dipole elements?	5
c	Find the half power beam width and directivity of the uniformly spaced N element array of isotropic elements in broadside case.	5

Q.no.	Module 4	Marks
4a	What is field the equivalence principle used for analysing aperture antennas?	4

Answer b or c

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| b | Define the original and equivalent problems using equivalence method of analysis. | 5 |
| c | How is Babinet's principle used in analysing a slot antenna? | 5 |

Q.no.	Module 5	Marks
5a	What are frequency independent and broadband antennas?	5

Answer b or c

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| b | Derive an expression for antenna surface having frequency independence property. | 7 |
| c | What is the method of analysing the radiation from a horn antenna? | 7 |

Q.no.	Module 6	Marks
6a	What are the benefits and drawbacks of smart antennas?	5

Answer b or c

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| b | What are the methods of analysis for microstrip antennas? | 7 |
| c | What are the basic features and applications of microstrip antennas? List the basic characteristics of rectangular microstrip antenna. | 7 |