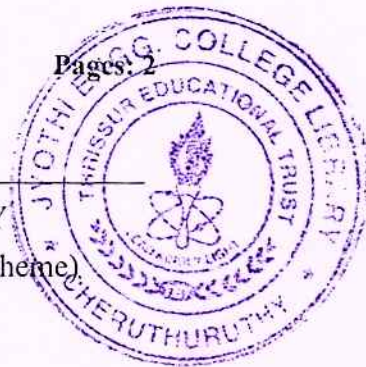


Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S7 (S,FE) (FT/WP/PT) Examinations May 2026 (2019 Scheme)



Course Code: ECT401

Course Name: MICROWAVES AND ANTENNAS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|--|-----|
| 1 | Draw the various radiation pattern lobes of an antenna. | (3) |
| 2 | What is Gunn effect. | (3) |
| 3 | Draw the mode characteristics of Reflex Klystron. | (3) |
| 4 | Find HPBW of an antenna which has a field given by $E(\theta) = \cos^2 \theta$ | (3) |
| 5 | What are Grating lobes. | (3) |
| 6 | Explain the need of cavity resonator. | (3) |
| 7 | Why log periodic antenna is called frequency independent antenna? | (3) |
| 8 | List the important properties of scattering parameter. | (3) |
| 9 | Find the FNBW of linear array of 4 isotropic point sources with $n=4$, $d=\lambda/2$ and $\delta=0$? | (3) |
| 10 | List the applications of Magic Tee. | (3) |

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

- | | | |
|----|--|-----|
| 11 | a) State and Prove Reciprocity theorem. | (7) |
| | b) Derive the expression for the Radiation Resistance and Directivity of short dipole antenna. | (7) |

OR

- | | | |
|----|---|-----|
| 12 | a) Explain Antenna field zones. | (6) |
| | b) The radial component of radiated power density of an infinitesimal linear dipole | (8) |

of length $l \ll \lambda$ is given by $W = A_0 \frac{\sin^2 \theta}{r^2} a_r \text{ W/m}^2$

Determine total radiated power and maximum directivity of the antenna.

Module II

- | | | |
|----|--|-----|
| 13 | a) With the help of diagram explain the feeding methods of microstrip patch antenna. | (4) |
|----|--|-----|

- b) Design a rectangular patch antenna using a substrate with dielectric constant of 10.5 and $h=0.125\text{cm}$ so as to resonate at 1.62 GHz (10)

OR

- 14 a) Draw and Explain the design steps of log periodic dipole array. (9)
b) Explain Inverted F antenna. (5)

Module III

- 15 a) Design a Dolph-Tchebyshev broad side array of 6 elements with spacing $d = \lambda/2$. (10)
The pattern is to be optimum with a side lobe of 30dB down the main lobe maximum.
b) Explain the need of Antenna arrays. (4)

OR

- 16 a) Derive the expressions for the array factor of a linear array of n -isotropic point sources of equal amplitude and spacing and calculate direction of maximum radiation and direction of null. (10)
b) What are phased arrays? (4)

Module IV

- 17 a) A rectangular cavity resonator has dimensions $a=5\text{cm}$, $b=2\text{cm}$, $d=15\text{cm}$. (4)
Compute the resonant frequency of TE_{101} mode
b) With neat diagrams describe the working principle of Reflex klystron. (10)

OR

- 18 a) With neat diagram describe the constructional features and working principle of a Travelling Wave Tube (8)
b) With the help of neat diagrams explain the working of a magnetron. (6)

Module V

- 19 a) List out the important properties of Magic Tee. Derive its Scattering parameters (10)
b) Write a short note on amplifiers using MESFET. (4)

OR

- 20 a) Explain Ridley -Watkins-Hilsum theory. (7)
b) With the help of a structure explain the working of a two-hole directional coupler. (7)
