**18EC403**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **July, 2021** | **Electronics & Communication Engineering** | | |
| **Fourth Semester** | **EM Waves and Transmission Lines** | | |
| **Time:** Three Hours | | **Maximum: 5**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (10X1 = 10 Marks) |
| *Answer* ***ONE*** *question from each Unit.* | | | (4X10=40 Marks) |

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| 1. | a) | Write down the boundary conditions for perfect dielectric materials. | CO1 | |  |
|  | b) | Define Snell’s law? | CO1 | |  |
|  | c) | What is the reflection coefficient of a transmission line when its load equal to its characteristic impedance? | CO2 | |  |
|  | d) | What is the significance of infinite line? | CO2 | |  |
|  | e) | Write the expression for determination of capacitance of two wire line. | CO2 | |  |
|  | f) | Define reflection loss. | CO1 | |  |
|  | g) | What is the importance of stub matching? | CO3 | |  |
|  | h) | Write the expression for guide wavelength. | CO3 | |  |
|  | i) | Distinguish between characteristic impedance and wave impedance. | CO4 | |  |
|  | j) | Define cut off frequency. | CO4 | |  |
| **Unit - I** | | | | | |
| 2. | a) | Discuss about dielectric-dielectric and dielectric-conductor boundary conditions | CO1 | **5M** | |
|  | b) | Two homogeneous isotropic dielectrics meet on plane z=0. For z≥0,=4 and for z≤0, =3. A uniform electric field E1= 5ax-2ay+3ax Kv/m exists for z≥0.  Find i) E2 for z≤0 ii) the angles E1 and E2 make with the interface | CO1 | **5M** | |
|  |  | **(OR)** |  |  | |
| 3. | a) | Derive the expressions for reflection coefficient and transmission coefficient for plane wave reflected by a perfect dielectric at normal incidence. | CO1 | **5M** | |
|  | b) | Discuss about surface impedance. | CO1 | **5M** | |
| **Unit - II** | | | | | |
| 4. | a) | Derive the expression for the constant r-circles of smith chart? | CO2 | **5M** | |
|  | b) | Derive the condition (RC=GL) for distortion less transmission line? | CO2 | **5M** | |
|  |  | **(OR)** |  |  | |
| 5. | a) | Derive the expression for input impedance of transmission lines? | CO2 | **5M** | |
|  | b) | A loss less line has a standing wave ratio of 4. The characteristic impedance is 150 ohms and the maximum voltage measured in the line is 135V. find the power delivered to the load | CO2 | **5M** | |
| **Unit - III** | | | | | |
| 6. | a) | Why TEM wave does not exist in hallow waveguide? | CO3 | **5M** | |
|  | b) | A rectangular waveguide with dimension 5x3 cm operates at 8 GHz. Then find ,, for dominate mode of TE? | CO3 | **5M** | |
|  |  | **(OR)** |  |  | |
| 7. | a) | Derive electric and magnetic field components for TM modes in rectangular waveguide. | CO3 | **5M** | |
|  | b) | Derive the expressions for guide wavelength and guide impedance in rectangular waveguide. | CO3 | **5M** | |
| **Unit - IV** | | | | | |
| 8. | a) | Derive electric and magnetic field components for TE modes in circular wave guide | CO4 | **5M** | |
|  | b) | Write short notes on Excitation of modes in circular waveguides. | CO4 | **5M** | |
|  |  | **(OR)** |  |  | |
| 9. | a) | Derive the characteristics of TE and TM in circular waveguide. | CO4 | **5M** | |
|  | b) | Calculate the cut-off wave length, the guide wavelength and the characteristic wave impedance of a circular waveguide whose internal diameter is 4cm for a 10GHz signal propagated in the dominate TE mode? | CO4 | **5M** | |

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