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**SHAMBHUNATH INSTITUTE OF ENGINEERING & TECHNOLOGY**

**Microwave Engineering (EEC 603)**

**B.Tech:- Electronics & Communication Engineering-(6th Semester)**

**HOME ASSIGNMENT(2016-17)**

**Q1 Attempt any all parts**  (a)Find the field equations for the **TE11**– mode if **Hz = Hoz cos(*m***$π$ ***x/a)* .cos(n** $π$ **y/b) exp(-jBz).**

(b)A TM**11** mode of 10 GHz is propagated in air filled rectangular waveguide. The magnitude of Electric field in X-direction is given by **Ez= Eo Cos(**$π$ ***z/(3)1/2) Cos(***$π$ **y/(5)1/2)** A/m. the phase constant β =1.0 rad/cm, The quantities z and y are in centimeters**, a=(5)1/2**,b=(3)**1/2** also in centimeters. Determine the cutoff frequency **fc** ,guided wavelength **λ g,**and the Electric field intensity in the y-direction.

( c) A rectangular wave guide is filled by dielectric material of **Єr =1.5** and has inside dimensions of 1.5x3.0cm. it operates in the dominant**TM11** mode. Determine (i)cut off frequency (ii)wave impedance in the guide at a frequency of 20GHz.

Q2. **Attempt all part**s

 (a) Find the wave equations for circular wave guide in TM**01** -mode if **Ez = Jn(Kcr)cosnφ e-jβz**

(b) A teflon of capacitivity of 2.1 filled circular waveguide has a radius of 2 cm and is used as a resonator for TE01 1 mode at 30GHZ by placing two perfectly conducting at its two ends .Determine the minimum distance between the two end plates.( **X’ 01 =3.832**)

(c) A rectangular-cavity resonator has dimensions of **a = 7 cm, b = 3.5 cm**, **and d = 15 cm**. Compute the resonant frequency of the dominant mode TM101 for dielectric filled cavity of **Єr = 2.25.** Also find loaded quality factor for under coupled cavity for reflection coefficient of 2.

Q3. **Attempt all part**s

 (a) Explain different types of modes and the radiation losses in micro strip line.

(b) A gold parallel strip line has the following parameters: relative dielectric constant of TEFLON **Єrd =2.1**,strip width **w =26mm**, separation distance **d =5 mm**, **conductivity of gold** 4.1**×107Mho/m,** and **frequency=10GHz** .Find characteristic impedance, capacitance, Inductance and phase velocity .

( c) A shielded strip line has the following parameters: dielectric constant **Єrd =2.25**,strip width **w=2mm,strip thickness t=0.5mm,shield depth d=4mm.** Calculate (i) The K-factor (ii)The fringing capacitance(ii)The characteristic impedance