**Registration No :**

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**Total Number of Pages : 02**                                                                  **B.Tech**

                                                                                                 **PCEC4402**

8th **Semester Back Examination 2018-19**
**MICROWAVE ENGINEERING**
**BRANCH : ECE, ETC**
**Time : 3 Hours**
**Max Marks : 70**
**Q.CODE : F066**
**Answer Question No.1 which is compulsory and any FIVE from the rest.**
**The figures in the right hand margin indicate marks.**

**Q1**   **Answer the following questions :**                                                **(2 x 10)**

a)  Why is S-Matrix used for Microwave analysis?

b)  Draw the diagram of H plane Tee Junction.

c)  Write condition for Quasi TEM mode with applications.

d)  What are the needs for impedance matching network?

e)  A directional coupler is having a coupling factor of 20 dB and directivity of 10 dB. If the incident power is 100 mW, What is the coupled power?

f)  Define cavity resonator? Which factor of cavity determines its equivalent inductance, capacitance and resistance?

g)  Differentiate between isolators and circulators.

h)  How does a reflex klystron differ from an amplifier klystron?

i)  What is a stub? Why short circuited stub is always preferred?

j)  What do you mean by slow wave structure? What is its significance?

**Q2** **a)** What is meant by impedance matching? Explain single stub matching and give its drawbacks.                                                                       **(5)**

**b)** A 4 W power source is connected to the input of a directional coupler with C= 20 dB , D= 35 dB and an insertion loss of 0.5 dB. Find the output powers (in dBm) at through, coupled and isolated ports. Assume all the ports to be matched .                                                                        **(5)**

**Q3** **a)** What is a Directional Coupler? How are its characteristics expressed? How can it be used in microwave high power measurement? Show that the spacing between centres of the two holes in a two-hole directional coupler must be an odd multiple of a quarter wavelength.                                          **(5)**

**b)** An air filled cavity resonator has its first 3 resonant modes at the frequencies 5.2GHz, 6.5 GHz, 7.2 GHz. Find the Dimension of the cavity.         **(5)**

**Q4** **a)** Explain how a Gunn diode is used as an oscillator with the evelopment of appropriates expression and sketches.                                          **(5)**

**b)** A three port circulator has an insertion loss of 1 dB, isolation 30 dB and VSWR = 1.5. Find the S- Matrix.                                                          **(5)**

**Q5** **a)** Discuss the hazards of EM radiation. Why are these labeled as azards?   **(5)**

**b)** Explain how a helical TWT achieves amplification. Give the applications of TWT.                                                                                   **(5)**

**Q6**     Derive the expression for electric and magnetic field for the rectangular     **(10)**
waveguide for TE modes.

**Q7**     Derive and explain the velocity modulation and transit time of Reflex klystron.     **(10)**

**Q8**     **Write short answer on any TWO :**                                          **(5 x 2)**
   **a)**   Working Principle of Magnetron
   **b)**   Microwave Filters
   **c)**   Rectangular cavities Resonator

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