

**2014**

**M.Sc.**

**4th Semester Examination**

**ELECTRONICS**

**PAPER—ELC-401**

*Full Marks : 50*

*Time : 2 hours*

*The figures in the right-hand margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

*Illustrate the answers wherever necessary.*

**(Microwave Devices and Circuits)**

**Answer Q. No. 1 and any three from the rest.**

1. (a) State and explain limitations of vacuum tubes in generating power at high frequency.
- (b) The dimension of the cross-section of an airfilled waveguide is 2.54 cm × 1.27 cm. Find the cut-off frequency for TE<sub>10</sub> mode.

*(Turn Over)*

- (c) Draw a neat sketch of a magic tee and state its transportation characteristics.
- (d) Draw the I-V characteristics of Tunnel diode and show its negative resistance region.
- (e) Define quality factor. How is quality factor related to the dimensions and surface resistivity of a cavity?
2. (a) What are the advantages and disadvantages of microstrip line?
- (b) Explain different losses in microstrip line.
- (c) Show that in quasi TEM mode of propagation a portion of either electric or magnetic field lies along the direction of propagation. 3+3+4
3. (a) Draw the neat sketch of a cylindrical magnetron. Derive an expression for the Hull cut off magnetic equation.
- (b) What do you mean by mode jumping and how can it be overcome. (1+7)+2
4. (a) State and explain Floquet's theorem.

- (b) Explain the operation of Helix Travelling Wave Tube with suitable diagram.
- (c) Write down names of few slow wave structure. 4+5+1
5. (a) Describe the operation of IMPATI diode and draw its small signal equivalent circuit.
- (b) Find an expression for total charge stored in a linearly graded junction of a varactor diode.
- (c) Discuss the use of varactor diode as parametric amplifier. 4+4+2
6. (a) Define coupling co-efficient and directivity of a directional coupler.
- (b) Derive expressions for resonant frequency of a rectangular cavity and a circular cavity for TE modes only.
- (c) Draw a neat sketch of a reflex Klystron and explain its operation. 3+3+4

**Internal Assessment — 10**

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