RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, MAY 2014

FIRST YEAR

Date : 30/05/2014 **ELECTRONICS (General)**

Time : 11 am – 1 pm Paper : II Full Marks : 50

Answer **any five** questions : [5×10]

1. a) Mention the advantages of FET over conventional transistor.
   b) Draw the symbols and give one example each of NPN and PNP transistors.
   c) What is Einstein's relationship in semiconductor device?
   d) What is the significance of Fermi level?
   e) What is the physical significance of 'Ripple Factor' in rectifier? [5×2]

2. a) Explain the operation of Transistor as an amplifier with a neat sketch.
   b) Draw and explain the output characteristics of NPN transistor in CE mode. [4+6]

3. a) Explain the operation of n-channel 'Enhancement'-mode MOSFET with proper diagram.
   b) Why Si is preferred over Ge in manufacturing semiconductor IC?
   c) What is peak inverse voltage of a P-N diode? What is its significance in case of design of a rectifier? [5+2+(2+1)]

4. a) Prove, $\mu = r_d \times g_{fs}$ for FET.
   b) Draw the static characteristics of FET and mention the Pinch-off region. [3+7]

5. A sinusoidal voltage of amplitude 25 volts and frequency 50Hz is applied to a half wave rectifier using PN diode. No filter is used and the load resistance is $1000\,\Omega$. The forward resistance R_f of the ideal diode is $10\,\Omega$. Calculate—
   a) Peak, average and r.m.s. values of load current.
   b) D.C Power output
   c) A.C. Power input
   d) Rectifier efficiency
   e) Ripple factor. [5×2]

6. Why h-model is called 'hybrid'? Draw and derive the expression of h-parameters of a transistor in CE mode. [2+8]

7. Write short notes (**any two**) : [5+5]
   a) Avalanche Breakdown
   b) Photo diode
   c) Potential barrier at PN junction
   d) DC load lin