# RAMAKRISHNA MISSION VIDYAMANDIRA

**(Residential Autonomous College under University of Calcutta)**

**B.A./B.SC. SECOND SEMESTER EXAMINATION, MAY 2012**

**FIRST YEAR**

Date : 28/05/2012 **ELECTRONICS (General)**

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

Answer **any five** questions :

1. a) What do you mean by Fermi level? [2]
   b) Show the position of Fermi level for intrinsic and extrinsic semiconductors. [3]
   c) How does a semiconductor differ from a metal considering the energy band structure? [3]
   d) State 'Mass-action' law. [2]

2. a) Describe how the barrier field is formed across a P-N junction. [5]
   b) Can you measure the barrier potential with a voltmeter? Explain. [2]
   c) Describe the origin of reverse saturation current in P-N diode. [3]

3. a) How does a photodiode work? [3]
   b) How does a Zener diode act as a voltage regulator? [2]
   c) Distinguish between Avalanche breakdown and Zener breakdown. [5]

4. a) Explain with a circuit diagram the operation of a full wave bridge rectifier. [2+4]
   b) Define Ripple voltage and Ripple factor. [2+2]

5. a) Define $\alpha$ and $\beta$ of a BJT and derive the relation between them. [1+1+1]
   b) Draw the output characteristics of the CE mode for a BJT. Indicate the different regions on the characteristics. [2+2]
   c) Derive the load-line for a CE amplifier and draw it on the output characteristics. [2+1]

6. a) 'BJT' is a current-controlled device but FET is a voltage controlled device'— Why? [3]
   b) Distinguish between BJT and FET. [4]
   c) Draw the transfer characteristics of a p-channel JFET. Define transconductance of a FET. [2+1]

7. a) Briefly describe the operation of an enhancement mode P-channel MOSFET. [5]
   b) Derive the small signal ac equivalent circuit of a common-source FET amplifier. [5]