

**Electronic Devices & Circuits**  
**(EC-201, DEC-2005)**

**Note:** Section A is compulsory. Attempt any four questions from Section B and any two questions from Section C.

**Section-A**

1. (a) What is the main important difference between the characteristics of a simple switch and those of an ideal diode?  
(b) Compare JFET and MOSFET. Mention at least four points.  
(c) What is reverse Recovery Time?  
(d) A dc voltage supply provides 60V when output is unloaded. When connected to a load the output drops to 56V. Calculate the values of voltage regulation.  
(e) What is "Dark current" of a photodiode?  
(f) What is negative resistance region?  
(g) Which two methods makes the collector current constant. Explain them.  
(h) What is foldback limiting?  
(i) Calculate dc voltage across 1 K $\Omega$  load for a RC filter (R=120 $\Omega$ , C=10m F). The dc voltage across the initial filter capacitor is 60V.  
(j) Draw the piecewise linear equivalent circuit of diode and explain it briefly.

**Section-B**

2. Explain the working of CMOS Inverter. Also mention the applications and advantages over other approaches.
3. (a) Describe the differences between  $r_e$  and hybrid equivalent for a BJT transistor.  
(b) For each model, list the conditions under which it should be applied.
4. A full wave bridge rectifier with 120V rms sinusoidal input has a load resistor of 1k $\Omega$ .  
(i) If silicon diodes are employed, what is dc voltage available at load?  
(ii) Determine required PIV rating of each diode.  
(iii) Find maximum current through each diode during condition.  
(iv) What is required power rating of each diode?
5. A silicon transistor with  $\beta = 100$  is to be used in self biasing circuit shown in figure below, such that the Q-point corresponds to  $V_{CE} = 12V$  and  $I_C = 2m A$ . Find  $R_E$  if  $V_{CC} = 24V$  and  $R_C = 5K\Omega$ .  
Fig.
6. (a) What is Miller Theorem?  
(b) Explain analysis of emitter follower by using this theorem.

**Section-C**

7. (a) What is the significant difference between the construction of an enhancement-type MOSFET and a depletion type MOSFET?  
(b) Sketch the circuit of a CS amplifier. Derive the expression for the voltage gain at low frequencies.
8. (a) For a zener diode network shown in below fig. Determine  $V_L$ ,  $V_R$ ,  $I_Z$  and  $P_Z$ .  
(b) What do you mean by hot carrier diode? Compare the characteristics of hot carrier and p-n junction diode?  
Fig.
9. (a) Design a self-bias network using a JFET transistor with  $I_{DSS} = 8m A$  and  $V_P = -6V$  to have a Q-point at  $I_{DQ} = 4m A$  using a supply of 14V. Assume the  $R_D = 3R_S$  and use standard values.  
(b) Discuss the three configurations of FET biasing. Explain any one in detail.