(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3073   Roll No. [　　　　　　　　　　　]

B. Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2010-11

SOLID STATE DEVICES AND CIRCUITS

Time : 3 Hours   *Total Marks : 100*

Note : Attempt all the questions.

1.   Answer any four parts :   (5×4=20)

   (a)   What is tunnel diode ? Explain its construction with neat and clean figure.

   (b)   What is photo diode ? Explain its construction, operation and characteristics.

   (c)   How Varactor diode works as a voltage variable capacitance ?

   (d)   Describe the V-I characteristics of Schottky diode and give its advantages.

   (e)   What is the responsivity of an InGaAs photodiode if its quantum efficiency is equal to 70% ? The energy gap of InGaAs is 0.75 eV.

   (f)   Explain how a transistor is used as an amplifier.

2.   Answer any four parts :   (5×4=20)

   (a)   Draw the O/P characteristics of JFET and an enhancement type MOSFET.

   (b)   What are the effects of an emitter-by pass capacitor on low frequency response of a multistage amplifier ?

   (c)   Can a depletion type MOSFET operate in enhancement mode ? If yes, why and how, and if no, why ?

(d) Describe in detail, how a JFET is biased.

(e) If $V_D = -4$ V and $I_{DSS} = 4$ mA plot gm versus I_{DSS} for a JFET.

(f) Compare JFET and MOSFETs.

3. Answer any **two** parts : $(10 \times 2 = 20)$

(a) Explain the high frequency response of an Amplifier.

(b) Explain the effect of bypass capacitor in the functioning of common-source amplifier.

(c) Derive the expression for the low frequency amplifier gain of common-emitter amplifier.

4. Answer any **two** parts : $(10 \times 2 = 20)$

(a) Obtain the expression of negative feedback amplifier gain in terms of basic gain of amplifier and feedback factor.

(b) The gain of an amplifier is 140, when negative feedback is introduced it is reduced to 17.5. Find the value of feedback factor.

(c) Describe the following

(i) Series-series feedback amplifier

(ii) Shunt-series feedback amplifier.

5. Answer any **two** parts : $(10 \times 2 = 20)$

(a) Deduce the condition of oscillation and frequency of oscillation of weinbridge oscillator.

(b) Write notes on the following :

(i) RC oscillators

(ii) Crystal oscillators

(c) If L = 800 mH, C = 0.01 μF, R = 1000 Ω and $C_m = 20$ PF are the various values of an ac equivalent circuit of a piezoelectric crystal, determine F_s and F_p of the crystal.