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

PAPER ID : 0321 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. III) THEORY EXAMINATION 2011-12

ANALOG AND DIGITAL ELECTRONICS

Time : 3 Hours *Total Marks : 100*

Note :– (1) Answer **all** questions.

(2) **All** questions carry equal marks.

1. Attempt any **four** parts of the following : **(5×4=20)**

(a) Explain the working of tunnel diode. Enlist its applications.

(b) Discuss how the variable capacitance is achieved in varactor diode. Enlist the application of varactor diode.

(c) Define "Dark current" in photodiode. Why photodiode is always used in reverse bias conditions ?

(d) Explain the principle and working of light emitting diode (LED) with V-I characteristic.

(e) How the construction of the Schottky barrier diode is different from conventional semiconductor diode significantly and describe its mode of operation.

(f) Explain the working of transistor as switch.

2. Attempt any **two** parts of the following : **(10×2=20)**

(a) Draw the equivalent circuit of BJT at high frequency and derive the expression for upper cut-off frequency.

(b) Discuss the higher and lower frequency response of RC coupled amplifier. Explain the effect of coupling and bypass capacitor on the bandwidth of an amplifier.

(c) List five characteristics of an amplifier, which are modified by negative feedback. Derive expression for the effective input and output resistance of current series feedback topologies.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) What are the Barkhausen conditions required for sustained sinusoidal oscillation ? Sketch the circuit of a Wein bridge oscillator and derive the expression for frequency of oscillation.

(b) Explain with the circuit diagram the working of a transistor RC phase shift oscillator and derive the condition for sustained oscillations.

(c) (i) Discuss how does the circuit of a Clapp oscillator differ from that of a Colpitt oscillator.

(ii) Explain the properties of a quartz crystal which are responsible for its use in an oscillator.

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) Sketch the circuit diagram for universal shift register and explain its working.

(b) (i) Implement the following Boolean function using 8×1 multiplexer :

$F(A,B,C,D) = \Sigma m(2,4,5,7,10,14)$.

(ii) Design a four bit synchronous up counter using J-K flip flop.

(c) (i) Explain the working of SR flip flop using NAND gates.

(ii) Discuss Race around condition of J-K flip flop. Show how this condition can be removed.

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) Design and explain a circuit diagram for astable multivibrator having 50% duty cycle using IC 555.

(b) Enlist the various types of analog to digital (A/D) converter. Explain the operation of R-2R ladder type digital to analog (D/A) converter with a neat sketch.

(c) Write short notes on the following :

(i) Series type voltage regulator

(ii) Sequential memory.