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

PAPER ID : 1254 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2013-14

ANALOG AND DIGITAL ELECTRONICS

Time : 3 Hours *Total Marks : 100*

Note :– Attempt **all** Sections.

SECTION–A

1. Attempt **all** parts of the following : **(10×2=20)**

   (a) Explain fan-in and fan-out and propagation delay in logic families.

   (b) Differentiate between combinational logic circuits and sequential logic circuits.

   (c) Give the State Transition diagram of R-S flip flop.

   (d) Explain Barkhausen's criteria for oscillations.

   (e) Give the pin diagram of IC 555.

   (f) Why photodiode is always used in reverse bias condition ?

   (g) Differentiate between an encoder and decoder.

   (h) Tabulate the excitation table of JK flip flop.

   (i) Simplify the following three variable Boolean expression :

   $Y = \Sigma m(2, 4, 6)$

   (j) Give the ideal characteristics of operational-amplifier.

SECTION–B

2. Attempt any **three** parts of the following : **(10×3=30)**

(a) Explain the working of transistor as a switch. Define rise time, fall time, delay time, storage time.

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

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

(ii) Design a BCD to Excess–3 code converter.

(c) (i) Explain the working of RC ladder phase shift oscillator. Give the frequency at which we obtain sustained oscillations.

(ii) In a Colpitt's oscillator, if the desired frequency is 500 kHz estimate the value of L and C.

(d) (i) What are voltage regulators ? Discuss the working of shunt and series op-amp based voltage regulators.

(ii) Write a short note on Switch Mode Power Supply (SMPS).

(e) (i) Derive the input and output resistance of a Transconductance and Voltage amplifier.

(ii) Give the general properties of negative feedback. Explain how negative feedback can affect the properties of input impedance, output impedance and bandwidth stability.

SECTION–C

Note :– Attempt **all** questions. All questions are compulsory and carry equal marks.

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

(a) Realize a JK Flip Flop using R-S Flip Flop.

(b) Explain the working of Switch Tail Ring Counter.

(c) Design a Modulo-5 synchronous counter using T Flip Flop.

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

(a) Explain the characteristics of a varactor diode and mention how it can be used in a resonant circuit. Also list some of its applications.

(b) Explain the working of Hartley Oscillator with suitable diagram. Give its expression for frequency of oscillation.

(c) Give the circuit diagram of a Non-Inverting Schmitt Trigger and derive the expression for hysteresis voltage.

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

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

(b) How the construction of a Schottky barrier diode is different from conventional semiconductor diode significantly ? Describe its mode of operation.

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

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

(a) Describe the wave shaping circuit in which two stable states are available.

(b) Draw and describe the principle of Wein Bridge Oscillator and give the condition for sustained oscillation using op amp.

(c) Describe the construction and working principle of Tunnel diode with suitable diagram and VI characteristic.

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

(a) Discuss the higher and lower frequency response of RC Coupled amplifier using BJT.

(b) Explain the working of universal shift register.

(c) Design a full adder circuit using decoder and logic gates.