

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

**PAPER ID : 1254** Roll No. 

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**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 :  
 $Y = \sum m(2, 4, 6)$
  - (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  $8 \times 1$  Mux :

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

(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.