

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

**PAPER ID : 0321**

Roll No.

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**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 :
- (a) Sketch the circuit diagram for universal shift register and explain its working.
  - (b) (i) Implement the following Boolean function using  $8 \times 1$  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.