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NEELKANTH INSTITUTE OF TECHNOLOGY

B.Tech ENE (Semester IV)

SESSIONAL EXAMINATION I 2014-2015

ANALOG AND DIGITAL ELECTRONICS (NEC-409)

Time: 1:30 Hours ***Total Marks 30***

NOTE: - i. *be precise in your Answer*

ii. *All section are compulsory*

SECTION A

1. **Attempt all the Questions: 1X10=10**
   (a) The Ip/ Iv ratio of a tunnel diode is of primary importance in
      i. Determining tunneling speed of electron
      ii. The design of an oscillator
      iii. Amplifier designing
      iv. Computer application
   (b) Mark the incorrect statement. A varactor diode
      i. Has variable resistance
      ii. Utilizes the transition capacitance of a junction
      iii. Has always a uniform doping profile
      iv. Is often used as an automatic frequency control device
   (c) High frequency used an oscillator within the frequency range of 10-1000 KHz uses a _____ diode.
      i. Tunnel diode
      ii. PIN diode
      iii. Schottky Diode
      iv. Varactor diode
   (d) A PIN diode frequently used as
      i. Peak clipper
      ii. Voltage regulator
      iii. Harmonic Generator
      iv. Switching diode for frequencies up to GHz
   (e) Schottky diode work on the principle of
      i. Metal semiconductor Junction
      ii. Metal-N type semiconductor junction
      iii. Metal-P type semiconductor junction
      iv. Degenerate P & N Type semiconductor
   (f) If the BJT used an Switch and the input high is applied then the output will be
      i. Logically Low
      ii. Non-determinant
      iii. Logically High
      iv. None of these
   (g) Tunnel diode work in _____ & photodiode work in _____.
      i. Forward, Reverse
      ii. Forward, Forward
      iii. Reverse, Forward
      iv. Reverse, Reverse
   (h) Mid-band frequency range coupling and parasitic capacitor
      i. Short, Open
      ii. Open, Open
      iii. Short, Short
      iv. Open, Short

(i) Tunnel diode has an application in oscillator design, in which region the tunnel diode biased to get the oscillation effect
   i. In between the negative resistance region
   ii. The region where negative resistance behavior start
   iii. The region where the linear behavior seen

(j) When the reverse bias of the varactor diode increase
   i. Capacitance decrease
   ii. Leakage current decrease
   iii. Negative resistance increase
   iv. Depletion region decrease

SECTION B

2. **Attempt any Five Question : 2X5=10**

(a) Draw the band diagram of PN Junction Photo diode under open circuit forward and reverse bias.

(b) Draw the characteristics of varactor diode with reference to the applied reverse bias & write down the expression for Cj(V).

(c) Write down the material used for the manufacturing of Red, IR, Green, & Yellow LED.

(d) Write down the application of tunnel diode and differentiate between tunnel and conventional PN diode.

(e) Draw the circuit diagram of MOSFET as a switch and show how the circuit behave when the logic low and high is applied.

(f) Write down the definition of Octave and Decade & What happens in mid-band, Low frequency band and high frequency band.

(g) For an amplifier 3-dB gain is 200 and higher cut-off frequency is 20KHz. Find the gain of the amplifier at the frequency 100 KHz.

SECTION C

3. **Attempt any Two Questions: 5X2=10**

(a) By using the model derive an expression for the gain in low frequency band, High frequency band & Mid-frequency Band with suitable diagram.

(b) Explain the working of negative resistance oscillator using tunnel diode

(c) Explain the basic principle behind the Schottky barrier and write down the application of Schottky diode. (All energy band diagram are required)