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

PAPER ID : 3073 Roll No. | | | | | | | | | | |

B.Tech

(SEM III) ODD SEMESTER THEORY EXAMINATION 2009-10

SOLID STATE DEVICES & CIRCUITS

Time : 3 Hours] *[Total Marks : 100*

Note : *Attempt all questions.*

1 Attempt any **two** parts of the following : **10×2=20**

(a) What is a photo diode ? With proper characteristic curves and relevant diagrams explain the operation of the device. What are its applications ? **2+6+2**

(b) Draw the hybrid - pi model of a BJT in common emitter (CE) configuration and discuss about each component in the model. **10**

(c) (i) With the help of a neat diagram explain the voltage divider biasing method for BJT. **5+5**

(ii) With relevant diagram, explain about Schottky barrier diodes.

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

(a) (i) Present a comparison of performance characteristics of the three BJT amplifiers configuration in qualitative terms, regarding their input output impedances and voltage current gains. **5**

(ii) Explain how a BJT can be used as a switch. **5**

(b) Sketch the basic structure of an n-channel JFET and draw the volt ampere (I/V) characteristics and explain about each region of the volt-ampere (I/V) characteristics qualitatively. **10**

(c) (i) Explain the terms : Depletion mode and enhancement mode. Inbuilt and induced channel. **5**

(ii) Compare the three configurations of a single stage MOS amplifier. **5**

3 Attempt any **two** parts :

(a) Explain in detail the physical origin and significance of the two capacitances in the hybrid-pi model of a BJT. Explain why CB and CC amplifiers have a larger band width than that of CE amplifier. **10**

(b) Discuss the frequency response characteristics of RC coupled amplifiers. Derive the general expression for gain at low and high frequency. **10**

(c) Sketch common collector and common emitter cascade amplifier. Show the small signal high frequency model for CE stage. **10**

4 Attempt any **two** of the following : **10×2=20**

(a) (i) List the four basic negative feedback configurations. **3**

(ii) Draw a block diagram of a single - loop feedback amplifier. Explain the function of each block. Indicate the effect of feedback on input and output resistance of the four topologies of negative feedback. **7**

(b) What type of negative feedback takes place in an emitter follower circuit ? Draw and analyse the circuit to derive an expression for voltage gain with feedback. **10**

(c) Explain with relevant information, how the negative feedback amplifier improves stability, reduces noise and increases the input impedance. **10**

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

(a) What are the requirement of an oscillator circuit ? Draw a neat diagram of a phase-shift oscillator using BJT. What advantage has the phase-shift oscillator in the audio frequency ? **10**

(b) Draw a neat circuit diagram of a Colpitt's oscillator using NPN transistor. Give its equivalent circuit. Derive expressions for the following : **10**

(i) The frequency of the oscillations

(ii) The maximum gain for sustained oscillations.

(c) (i) Draw the circuit of Wien bridge oscillator and explain how oscillations are generated. **6**

(ii) What are the advantages of using crystal oscillators ? Mention it's applications. **4**
