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Reg. No. : .....

Name : .....

Fourth Semester B.Tech. Degree Examination, December 2009
(2003 Scheme)
03.402: SOLID STATE DEVICES AND CIRCUITS (E)

Time : 3 Hours Max. Marks : 100

***Instruction**: Answer **all** questions from Part **A** and **any three** questions from Part **B** choosing not more than **one** question from **each** module.*

PART – A

1. Prove that the collector current of the transistor in the active region in CE configuration is $I_c = \beta I_B + (1 + \beta) I_{co}$.
2. What are the factors concerned for drifting of the operating point of a transistor amplifier ?
3. For a N- channel JFET $I_{DSS} = 16mA$, $V_P = 6V$, $G_{mo} = 4000$ ps. Calculate the drain current and trans conductance at $V_{GS} = -4V$.
4. Explain the working of a class C amplifier and give an application.
5. Determine the voltage gain, input and output impedance for voltage series feed back having A= – 100, Ri = 100 kΩ, Ro = 20kΩ for feed back with B = – 0.1.
6. Explain why cristal oscillator have very high frequency stability.
7. What is meant by drift compensation ?
8. Define slew rate of an opamp.
9. Explain how opamp is used as integrator.
10. What is the effect of noise on zero crossing detector. **(4×10=40 Marks)**

P.T.O.

Module – I

11. a) What is the need of bias compensation in transistor amplifiers and with a neat sketch explain one method of Bias compensation.

    b) Draw the equivalent circuit of a transistor amplifier in CB configuration using h parameters and derive expressions for current gain, input impedance, voltage gain, output admittance and power gain.

12. a) Draw a self biased JFET common source amplifier and explain its operation.

    b) Derive an expression for the voltage gain of a source follower JFET amplifier with a drain resistance R_P.

Module –II

13. a) Draw the circuit diagram of a transformer coupled amplifier and explain the function of each of the components used. Plot its frequency response.

    b) Explain the operation of a series fed class A amplifier and obtain the expression for over all efficiency. Also find the maximum efficiency.

14. a) Discuss about the factors responsible for causing distortion in amplifiers.

    b) What is negative feed back and how it will improve the stability of an amplifier ? Explain the working of an RC phase shift oscillator.

Module – III

15. a) Compare the characteristics of 741 and 301 IC operational amplifiers.

    b) An amplifier with 2.2 KΩ input resistance and 40 kΩ output resistance has a voltage gain of 80. The amplifier is modified to provide 15% negative feed back in series with the input. Calculate

    i) Voltage gain with feed back

    ii) R_{if} and R_{of}

16. a) Discuss the necessity for frequency compensation in opamps.

    b) Explain how an op-amp can be used as a voltage level detector. List the important characteristics of a comparator. **(3×20=60 Marks)**

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