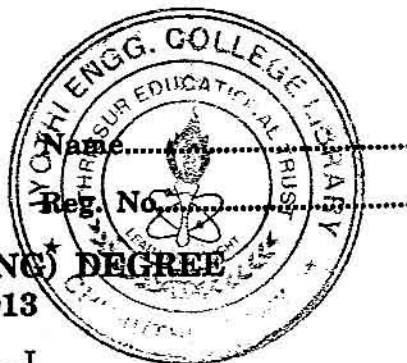**D 51036**
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## THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, NOVEMBER 2013

### AI 09 303—ELECTRONIC CIRCUITS—I

Time : Three Hours
Maximum : 70 Marks

### Part A

*Answer all questions.*

1. What do you mean by saturation of a transistor ?

2. Bring out a neat comparison between a JFET and a MOSFET.

3. A $\pi$-filter in a full wave rectifier uses $C_1 = C_2 = 100\ \mu F$ and $L = 10\ H$. The load current is 0.5 A at 100 V d.c. Find the ripple factor.

4. Can the value of stability factor be less than unity ? Explain it briefly.

5. Explain how a MOSFET is used as a Load.

(5 × 2 = 10 marks)

### Part B

*Answer any four questions.*

6. Explain the terms (a) Maximum collector current ; (b) Maximum power dissipation ; and (c) Maximum output voltage.

7. List the advantages and disadvantages of FET over bipolar transistors.

8. A transformer with 20V r.m.s., 50 Hz secondary, supplies a bridge rectifier having a load of 200 $\Omega$. Determine the d.c. output voltage, d.c. load current and PIV rating of a diode.

9. How would you provide temperature compensation for the variations of $V_{BE}$ and stabilization of the operating point ?

10. What do you mean by a multistage amplifier ? Explain it briefly.

11. What is Miller effect capacitance ? Explain with example.

(4 × 5 = 20 marks)

### Part C

*Answer all questions.*

12. (a) (i) Describe the different types of capacitors.                    (8 marks)

    (ii) The resistance of a 50 mH coil is 30 ohms. What is Q-factor of the coil at 5 kHz ?

(2 marks)

*Or*

**Turn over**

(b) Define the following terms for a JFET : (a) The pinch-off voltage ; (b) Channel ohmic region ; (c) Drain resistance ; (d) Transconductance ; (e) $I_{DSS}$ ; and (f) $I_{GSS}$.

(10 marks)

13. (a) (i) What is efficiency of rectification ? Compare half-wave and full-wave rectifiers from the point of view of rectification efficiency.

(4 marks)

(ii) Define : (a) a ripple factor ; (b) rectification efficiency ; and (c) transformer utilization factor for a rectifier.

(6 marks)

Or

(b) (i) Describe a Zener shunt regulator circuit.                                                   (4 marks)

(ii) A Zener diode shunt regulator circuit is to be designated to maintain a constant load current of 400 mA and voltage of 40 volts. The input voltage is $90 \pm 5$ V. The Zener diode voltage is 40 V and its dynamic resistance is 2.5 $\Omega$. Find the following quantities for the regulator : (1) the series dropping resistance ($R_s$) ; (2) Zener power dissipation ; and (3) Load resistance ($R_L$). Assume the Zener current to be 10% of load current.

(6 marks)

14. (a) Draw the circuit diagram of a Darlington emitter follower and derive the expressions for its input resistance, output resistance, current gain, voltage gain and power gain.

(10 marks)

Or

(b) Give a comparison of the voltage and current gains, input and output resistance of common emitter, common base and common collector transistor amplifiers. Also give one important application of each transistor amplifier.

(10 marks)

15. (a) (i) What is the effect of external source resistance on the voltage gain of a common source amplifier ? Explain with necessary derivation.

(8 marks)

(ii) A JFET amplifier has $g_m = 2.5$ mA/V and $r_D = 500$ k$\Omega$. The load resistance is 10 k$\Omega$. Find the value of voltage gain.

(2 marks)

Or

(b) What specific capacitance has the greatest effect on the high frequency response of a cascade of FET amplifiers ? Explain.

(10 marks)

$[4 \times 10 = 40$ marks$]$