MANIPAL INSTITUTE OF TECHNOLOGY
(A Constituent Institute of Manipal University)
Manipal – 576 104

III SEM. B.Tech (BME) DEGREE MAKE-UP EXAMINATIONS, DEC/JAN 2015-16
SUBJECT: ELECTRONIC DEVICES AND CIRCUIT (BME-201)
Wednesday, December 30, 2015 (9.00 a.m. - 12.00 noon)

TIME: 3 HOURS   MAX. MARKS: 100

Instruction to Candidates:

Answer any FIVE full questions.
Assume relevant data if missing.
Give diagrams wherever necessary.

1. (a) Sketch the structure and explain the working of Zener diode.   (6)

    (b) Sketch the structure and the drain characteristics of Dual-mode MOSFET.   (2+2)

    (c) How do you experimentally determine intrinsic stand-off ratio of an UJT?   (6)

    (d) What is base width modulation? What are its consequences?   (4)

2. (a) Draw common collector transistor amplifier circuit with source resistance 500Ω,   (8)
         load resistance 5000Ω. Calculate current gain, voltage gain, input impedance and
         output impedance. $h_{fe} = 50, h_{ie} = 1K, h_{oe} = 25\mu\Omega$

    (b) What do you understand by transistor biasing? What is its need? Mention various   (6)
         methods of biasing stating their advantages and disadvantages. How stabilization
         of operating point is achieved by potential divider method?

    (c) The circuit diagram shown in Fig 3C depicts that a silicon transistor with β=100   (3)
         is biased by fixed bias method. Draw the dc load line and determine the
         operating point. What is the stability factor?

    (d) What is the magnitude of current flowing through a forward biased Silicon pn-   (3)
         junction diode, if the voltage across the diode is 2V, and reverse saturation
         current Io = 1μA.

3. (a) Draw the simplified hybrid model of common emitter amplifier with emitter   (8)
         resistance and determine the approximate values of current gain, voltage gain,
         input impedance and output impedance.

    (b) Draw the small signal model of common collector configuration and express   (6)
         common collector hybrid parameters in terms of common emitter hybrid
         parameters.

    (c) Explain the terms: i) Thermal runaway ii) Bias instability   (6)

4. (a) For the circuit shown in Fig 4A, determine trans conductance, input and output (8) impedance. Also find voltage gain. The result of the dc analysis is as follows:
$V_{GSQ} = -2.86v, I_{DQ} = 4.56mA, r_d = 40K\Omega, V_P = -4v$ & $I_{DSS} = 16mA$.

(b) Describe the following terms; i) FET fixed Bias circuit ii) FET emitter bias (6) circuit

(c) For a self-bias circuit, derive an expression for stability factor that conveys (6) stabilization against variations in the reverse saturation current by keeping β & V_{BE} constant.

5. (a) Draw hybrid-pi model of a Germanium transistor in common emitter (2+2+2+2) configuration and derive expressions for the input, feedback and output conductance.

(b) What are the advantages and drawbacks of Integrated circuits? How are (4+2) integrated circuits classified?

(c) How are integrated diodes produced? Explain. (6)

6. (a) With the help of circuit diagram and waveforms explain working of an UJT (4+1) relaxation oscillator. How do you theoretically compute the frequency of oscillation?

(b) Draw the structure of TRIAC and explain its working. (2+4)

(c) Draw the symbol and list applications of Tunnel diode. (3)

(d) Draw the circuit of common drain amplifier. With a low frequency model, derive (6) expressions for voltage gain, current gain, input impedance and output impedance.
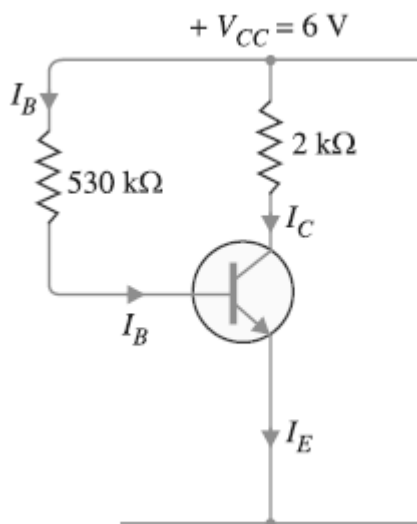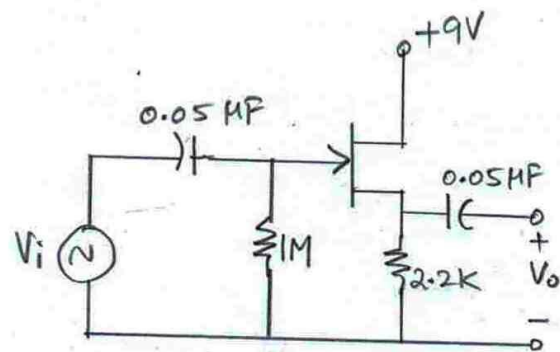

Fig 3 C

Fig 4 A