Reg. No. :

Question Paper Code : 52440

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Third Semester

Electronics and Communication Engineering

EC 2205 – ELECTRONIC CIRCUITS – I

[Common to Medical Electronics Engineering]

(Regulations 2008)

Time : Three Hours Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. What is the advantage of having an emitter resistor in BJT biasing circuit ?

2. What is the impact of temperature on drain current of MOSFET ?

3. Draw the small-signal ac equivalent circuit of the BJT.

4. Define CMRR.

5. Draw the high frequency small-signal equivalent circuit of a MOSFET.

6. Determine the unity-gain bandwidth of a FET with parameters, Cgd = 10 fF, Cgs = 50 fF and gm = 1.2 mA/V.

7. What is thermal runaway ?

8. What is second harmonic distortion ?

9. Give the expressions for ripple factor of a full wave rectifier without and with capacitive filter.

10. What is advantage of SMPS over linear power supply ?

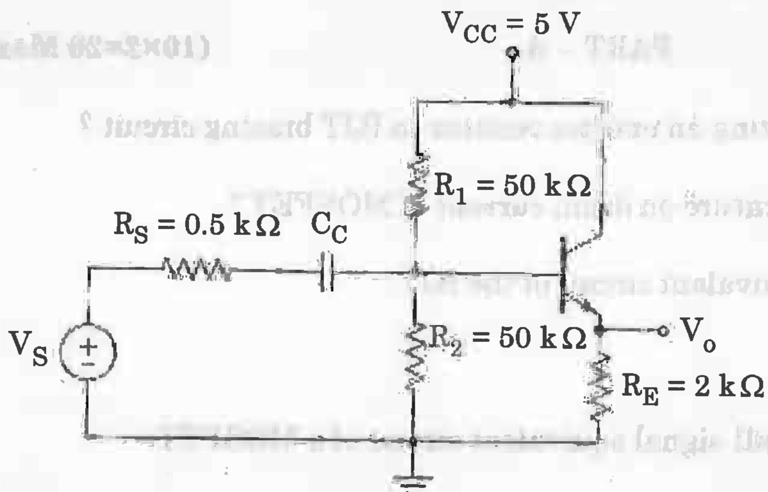
PART – B (5×16=80 Marks)

11. a) Analyze a BJT with a voltage divider bias circuit, and determine the change in the Q-point with a variation in β when the circuit contains an emitter resistor. Let the biasing resistors be $R_{B1} = 56\ k\Omega$, $RB_2 = 12.2\ k\Omega$, $RC = 2\ k\Omega$, $R_E = 0.4\ k\Omega$, $V_{CC} = 10\ V$, $V_{BE}(on) = 0.7\ V$ and $\beta = 100$.

(OR)

b) Discuss on bias stabilization using self-bias. Also derive the expressions for the different stability factors for a self-biased BJT circuit.

12. a) Derive the expression for small-signal voltage gain of the emitter-follower circuit shown in the figure below. Also calculate the small-signal voltage gain assuming the transistor parameters as $\beta = 100$, $V_{BE}(on) = 0.7\ V$ and $V_A = 80\ V$.



(OR)

b) Analyze a basic common-base amplifier circuit and derive the expressions for its small-signal voltage gain, current gain, input impedance and output impedance.

13. a) Derive the expression for cut-off frequency of a BJT. Also determine the 3 dB bandwidth and cut-off frequency of the BJT biased at IC = 0.15 mA and has parameters $\beta_0 = 150$, $C_\pi = 0.8\ pF$ and $C_\mu = 0.012\ pF$.

(OR)

b) Derive the expression for Miller capacitance in BJT and draw the equivalent circuit of a common-emitter amplifier including the Miller capacitance. Also determine the 3 dB frequency of the current gain for the circuit both with and without the effect of C_M for the given circuit parameters : $R_C = R_L = 4\ k\Omega$, $r_\pi = 2.6\ k\Omega$, $R_B = 200\ k\Omega$, $C_\pi = 0.8\ pF$, $C_\mu = 0.05\ pF$ and $g_m = 38.5\ mA/V$.

14. a) With neat diagrams, explain the operation of the following power amplifiers and derive the expression for their maximum theoretical efficiency.

i) Transformer-coupled Class-A amplifier.

ii) Class-B push-pull amplifier.

(OR)

b) With neat diagrams, explain the operation of Class-C, Class-D and Class-S power amplifiers. Also list the advantages, disadvantages and applications.

15. a) With necessary diagrams, explain the operation of half-wave and full-wave rectifiers. Also derive and compare their ripple factor values.

(OR)

b) Explain the operation of a simple zener voltage regulator. Also explain how overload protection can be implemented through current-limiting circuit.
