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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, B.E. – Electronics and Communications Engineering

Semester End Examination; Dec. - 2014

Transistor Circuits

Time: 3 hrs *Max. Marks: 100*

***Note** :i) Answer **FIVE** full questions, selecting **ONE** full question from each **Unit**.*
ii) Assume suitable missing data if any.

Unit - I

1 a. Discuss the approximate and piecewise linear model of a diode. 6

b. Determine the current I_1, I_2 and I_{D2} for the network shown below in Fig. (b) 8

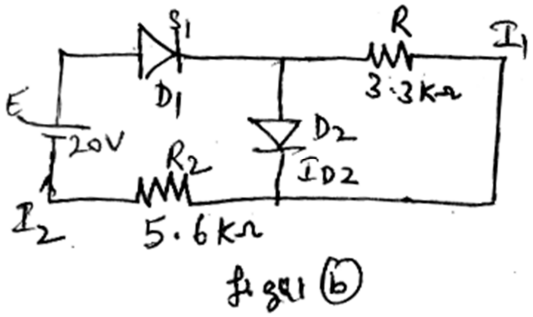

Fig Q1 (b)

c. What is a clamper? With a neat circuit and waveform explain positive clamper. 6

2 a. What is biasing of a transistor? Explain the factors that affect selection of Q point anywhere in active region for the transistor to operate as an amplifier. 6

b. Determine the dc bias voltage V_{CE} and the current I_C for the voltage divider configuration of Fig. 2 (b) shown below. 8

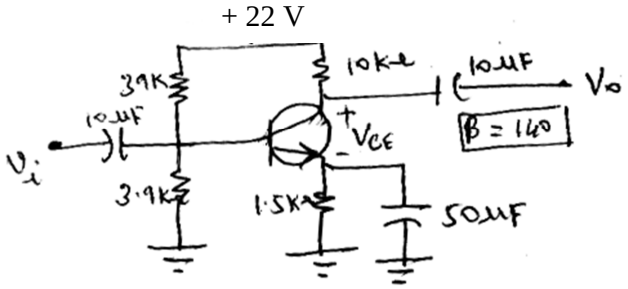

Fig 2 Q (b)

c. With the help of a neat diagram explain the use of transistor as an inverter. 6

Unit - II

3a. What are the advantages of using hybrid model to represent the transistor? Explain how h – parameter can be obtained from the transistor. 6

b. For the CE amplifier circuit derive the expression for A_I, Z_i, A_v and V_0 in term of transistor h – parameter. 8

c. For CB configuration shown below in Fig.3 (c), determine Z_i, Z_0, A_v and V_i 6

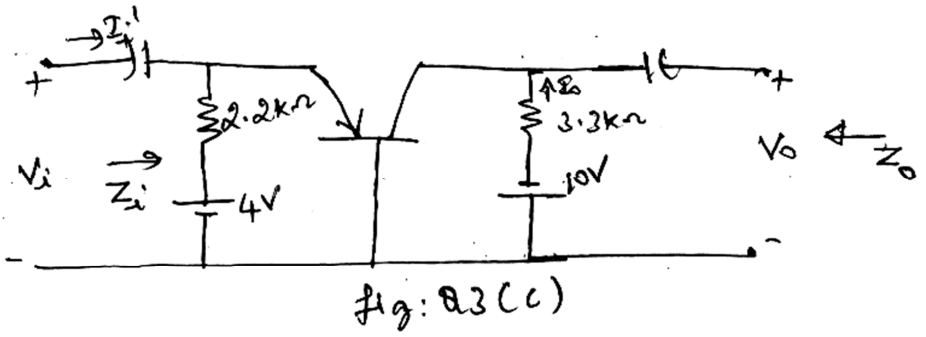

Fig: Q3(c)

4 a. Briefly explain the miller effect capacitance. 10

b. Discuss the factors that affect the low frequency response of a BJT – CE amplifier. 10

Unit - III

5 a. With a neat diagram, determine the expression for Z_{in}, A_v, Z_0 for a Darlington emitter follower. 10

b. Compare the cascade and cascode connection. List the advantages and disadvantages. 10

6 a. Explain the feedback connection types with a neat diagram and tabulate the summary of gain without feedback and gain with feedback. 10

b. What are the effects of negative feedback? 4

c. Determine the voltage gain, input and output impedance with feedback for voltage series feedback having A = - 100, R_i = 10 kΩ, R_0 = 20 kΩ for feedback of 6

(i) β = -0.1 (ii) β = - 0.5

Unit - IV

7 a. With a net sketch explain the classification of power amplifier based on the location of Q – point? 10

b. Derive an equation for second harmonic distortion in terms of current. 10

8 a. Explain the working of a transformer coupled class A amplifier and prove that the maximum efficiency for the same is 50%. 10

b. Calculate the efficiency of a transformer coupled class A amplifier for a supply of 12 V and output of 12 V. 4

c. For a class B amplifier providing a 20V peak signal to a 16Ω loud speaker and a power supply of VCC = 30V, determine the input power, output power and – circuit efficiency. 6

Unit - V

9 a. Explain how a feedback circuit can be used as an oscillator. 6

b. Calculate operating frequency of a BJT phase – shift oscillator for R = 6 kΩ, C = 1500 pF, R_c = 18 kΩ. 4

Contd…3

c. Explain the characteristics of a quartz crystal with a neat diagram explain the crystal oscillator in parallel – resonant circuits. 10

10 a. With the help of transfer characteristics explain how trans conductance of a FET can be obtained using graphical method. 6

b. Design the FET fixed bias circuit for the following specification given A_v = 10, I_{DSS} = 10 mA, V_P = - 4V, y_{OS} = 20 μs, V_{DD} = 30 V, C_1 = 0.1 μF, R_G = 10 MΩ. 8

c. Write the circuit symbol and small signal ac model of n – channel D – MOSFET and explain. 6

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