

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Third Semester B.Tech Degree (S,FE) Examination December 2020 (2015 Scheme)

**Course Code: EC205****Course Name: ELECTRONIC CIRCUITS (EC,AE)**

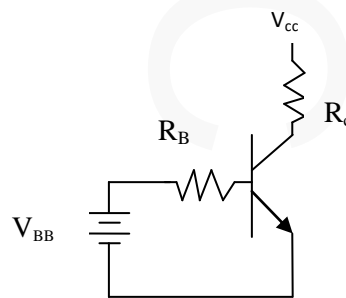
Max. Marks: 100

Duration: 3 Hours

**PART A***Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) Design and draw an RC differentiator circuit for a given input frequency of 2KHz. (4)
- b) What are the functions of various capacitors used in RC coupled amplifier? (3)
- c) Define stability factor. Derive an expression for the stability factor for leakage current of a voltage divider bias circuit. How does the voltage divider bias improve the stability of an amplifier circuit? (8)
- 2 a) With neat circuit diagrams, derive the design criteria for an RC circuit to function as (8)
- (i) Differentiator
- (ii) Low pass filter
- b) In the given circuit, Assume  $\beta=100$ ,  $V_{CC} = 5\text{ V}$ ,  $V_{BEON} = 0.7\text{V}$ ,  $R_C = 15\text{ K}\Omega$ ,  $R_B = 650\text{ K}\Omega$ ,  $V_{BB} = 2\text{V}$ , Determine  $I_{CQ}$ ,  $V_{CEQ}$ ,  $r_{\pi}$  and  $g_m$ . What will be the small signal voltage gain? Assume values for parameters that are not given. (7)



- 3 a) Explain the small signal hybrid pi model of transistor in the CE configuration with neat schematics. Derive the expression for voltage gain without bypass capacitor. (8)
- b) For a voltage divider bias circuit using  $V_{CC}=12\text{V}$ ,  $R_C = 2.2\text{K}\Omega$ ,  $R_E = 1.5\text{ K}\Omega$ ,  $R_1 = 7.2\text{ K}\Omega$ ,  $R_2 = 2.2\text{ K}\Omega$ ,  $R_L = 1\text{ K}\Omega$ , draw AC and DC load lines and locate the Q point. Assume values for parameters that are not given. (7)

**PART B**

*Answer any two full questions, each carries 15 marks.*

- 4 a) Explain various feedback topologies with neat sketches and derive the expressions for input and output impedances for all configurations. (9)
- b) Draw high frequency equivalent circuits of BJT and discuss Miller effect.. (6)
- 5 a) From the high frequency equivalent circuit, derive the expression for beta cut off frequency of a bipolar transistor. Draw the frequency response for short circuit current gain. (8)
- b) Draw the circuit diagram of a tuned amplifier and explain its working (4)
- c) Write short notes on cascade amplifiers with a neat sketch. (3)
- 6 a) Draw the circuit diagram of RC phase shift oscillator. Derive an expression for the frequency of oscillation. (9)
- b) Draw circuit diagrams of the feedback amplifier circuits using voltage series feedback and current series feedback. (6)

**PART C**

*Answer any two full questions, each carries 20 marks.*

- 7 a) Draw the circuit diagram of a transistor bootstrap generator and explain its working. What are its applications? (10)
- b) Explain various types of biasing methods used for MOSFET amplifiers. (6)
- c) Draw the small signal equivalent circuit of the MOSFET. (4)
- 8 a) Explain the working of monostable multi-vibrator with a neat circuit diagram and relevant waveforms. (10)
- b) Explain the working of transistor-based series voltage regulator with a neat circuit diagram. (10)
- 9 a) Explain the working of transformer coupled Class A power amplifier with a neat circuit diagram and collector waveforms. Derive the expression for collector efficiency. (10)
- b) Draw and explain the hysteresis curve in Schmitt Trigger. (5)
- c) How short circuit protection is achieved in series voltage regulator? Explain with a neat circuit diagram. (5)

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