Code No.: EC301PC | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Regular) - January- 2022
ELECTRONIC DEVICES AND CIRCUITS
(ECE)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub-questions.

PART-A **(20 Marks)**

1. a) Define diffusion and transition capacitance of p-n junction diode. [2M]
   b) Distinguish clippers and clampers circuits with figures. [2M]
   c) Obtain the condition for thermal stability of a BJT used in a biasing circuit? [2M]
   d) Describe thermal stability. [2M]
   e) Draw and explain Zener diode characteristics. [2M]
   f) Justify the statement " input impedance of FET is higher than BJT" [2M]
   g) Discuss briefly the advantages of h-parameter for analysis of amplifiers. [2M]
   h) Summarize the low frequency response of BJT amplifier. [2M]
   i) Explain the JFET Small signal Model. [2M]
   j) Analyze the MOSFET characteristics in enhancement mode with required diagrams. [2M]

PART-B **(50 Marks)**

2. List different part of V-I characteristics of a diode and also draw V-I characteristics of a PN diode for the following conditions: [10M]
   i) $R_f = 0$, $V\gamma = 0$, $R_r = \infty$
   ii) $R_f = 0$, $V\gamma = 0.6V$, $R_r = \infty$
   iii) R_f = Non-zero, fixed value, $V\gamma = 0$, $R_r = \infty$
   iv) R_f = Non-zero, fixed value, $V\gamma = 0.6V$, $R_r = \infty$
   Where $V\gamma$ is the cut-in voltage, R_f is the forward dynamic resistance & R_r is the reverse dynamic resistance of the diode.

OR

3. With reference to the rectifiers, explain the following terms and mention its values to different types of rectifiers: [10M]
   i) Ripple Factor
   ii) Efficiency
   iii) Peak Inverse Voltage (PIV)
   iv) % Regulation

4. Define Early-effect, justify why it is called as base-width modulation, and discuss its consequences in transistors in detail? [10M]

OR

5. a) Illustrate the circuit diagram of the NPN transistor in the Common Emitter (CE) configuration. [5M]

   b) With neat sketches and necessary equations, describe its input-output characteristics and clearly indicate the cut-off, saturation & active regions on the output characteristics? [5M]

6. With a neat sketch, discuss about common source FET amplifier, and explain, how FET is working as Voltage Variable Resistor? [10M]

OR

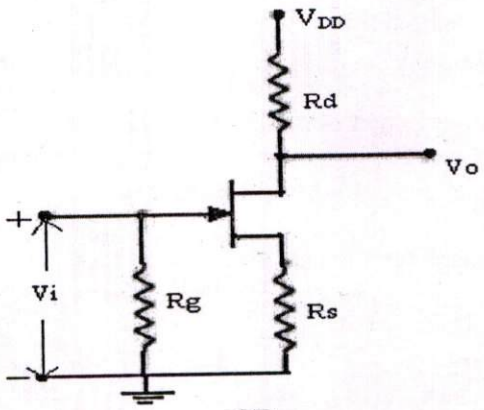
7. Explain the construction of FET and the principle of operation. Also compare the characteristics of FET with BJT [10M]

8. a) Draw and discuss the circuit diagram & small-signal equivalent of CB amplifier using the accurate h-parameter model. [5M]
   b) Derive expressions for A_V, A_I, R_I and R_O [5M]

OR

9. Analyze the small-signal equivalent circuit of Emitter Follower using accurate h-parameter model. For the emitter follower circuit with $R_S = 0.5$ K and $R_L = 5$K, Compute R_i, A_V and R_O. Assume, $h_{fe} = 50$, $h_{re} = 1$, $h_{oe} = 25$ μA/V and $h_{ie} = 1.1$K. [10M]

10. A Common Source FET amplifier circuit shown in Figure with un-bypassed R_S has the following circuit parameters: $R_d = 15$K, $R_S = 0.5$K, Rg = 1M, $r_d = 5$K, $g_m = 5$mS and $V_{DD} = 20$ V. Calculate R_i, A_V and R_O [10M]



OR

11. List the different types of MOSFETs, discuss the differences between the construction & operation of a N-channel MOSFET in enhancement and depletion modes with diagrams [10M]

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