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# 328353(28)

## B. E. (Third Semester) Examination, April-May 2020

**(New Scheme)**

**(Electronics & Telecommunication Engg. Branch)**

**ELECTRONIC DEVICES and CIRCUITS**

***Time Allowed : Three hours***

***Maximum Marks : 80***

***Minimum Pass Marks : 28***

***Note :*** *Attempt all questions. Part (a) of each question is compulsory and carries 2 marks. Attempt any* ***two*** *parts from part (b), (c) & (d) which carries 7 marks each. Assume suitable data if required.*

**Unit-I**

**1.** (a) State Mass-Action Law as an equation and in words. 2

(b) Explain the current conduction in semiconductor by drift and diffusion process. 7

(c) Prove that for a step-graded p-n junction diode the contact potential is : 7

$$V_{o^-} = V_T \ln \frac{N_D N_A}{\eta_i^2}$$

(d) Discuss the law of conservation of charge in detail. 7

## Unit-II

**2.** (a) Draw V-I characteristics of ideal and practical p-n junction silicon diode. 2

(b) Draw the circuit diagram of full-wave Bridge rectifier and derive its ripple factor and efficiency. 7

(c) Explain Zener diode as Voltage regulator. 7

(d) Discuss the effects of temperature on diode current and voltage. 7

## Unit-III

**3.** (a) What is a Transistor? Why is it so called? 2

(b) Explain the following terms : 7

(i) Operating point

(ii) Punch Through





(iii) Thermal Runaway

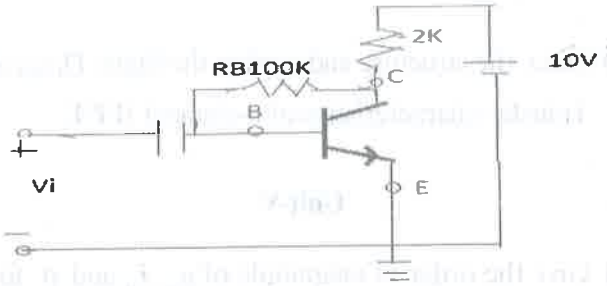
(iv) Advantage of CE over CB and CC configurations

(v) Early effect

(c) For the circuit shown : 7

(i) Calculate $I_B$, $I_C$ and $V_{CE}$ if a Silicon transistors used with $\beta = 50$.

(ii) Specify a value for $R_B$ so that $V_{CE} = 7$ V.




(d) List various Bias Compensation Techniques and explain any two in brief. 7

## Unit-IV

**4.** (a) Why FET is called a voltage controlled device? 2

(b) (i) Explain why does the Drain current $I_D$ not reduced to zero even after the channel is pinched off.

(ii) Why input impedance of FET is high?

(iii) Obtain the expression for the Pinch OFF voltage $V_P$ in case of $n$-channel JFET. 7

(c) An $n$-channel JFET has $I_{DSS}$ = 12 mA and pinch off voltage $V_P$ = – 4 V. Find the drain current for $V_{GS}$ = –2 V. If transconductance $g_m$ of a JFET with the same $I_{DSS}$ at $V_{GS}$ = 0 V is 4 m Mho, find the pinch off voltage. 7

(d) Draw the structure and explain the Static Drain and Transfer characteristics of n-channel JFET. 7

## Unit-V

**5.** (a) Give the order of magnitude of $g_m$, $r_d$ and $\mu$ for a MOSFET. 2

(b) Draw the structure of p-channel depletion MOSFET and qualitatively explain the static drain and gate characteristics of the device. 7

(c) Compare E-MOSFET with D-MOSFET. 7

(d) (i) Explain working of MOSFET as a switch.

(ii) Explain Body effect with suitable sketch. 7