



# GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

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Name of Examination : **Winter 2020** - (Preview)

Course Code & Course Name : **ET202U - Electronic Devices and Circuits**

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Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

## 1) Solve any two sub-question

- a) Explain the operating principle and applications of the photodiode. [6]
- b) Explain positive clamper circuit [6]
- c) Write types, merits, demerits and applications of optocouplers. [6]

## 2) Solve any two sub-question

- a) Explain the operating point concept. [6]
- b) Draw a hybrid model of a BJT. Also, write the merits of the h-parameter. [6]
- c) Find the required collector feedback bias resistor for an emitter current of 1 mA, a 4.7k collector load resistor, and a transistor with  $\beta=100$ . Find the collector voltage  $V_C$ . [6]

## 3) Solve any two sub-question

- a) Calculate  $I_D$  and  $V_{DS(sat)}$  in an n-channel JFET. Assume the saturation current is  $I_{DSS} = 2$  mA and the pinch-off voltage is  $V_P = -3.5$  V. Calculate  $I_D$  and  $V_{DS(sat)}$  for  $V_{GS} = 0$ ,  $V_P/4$ , and  $V_P/2$ . [6]
- b) Draw and explain the working principle of MOSFET [6]
- c) Draw and explain construction of p-channel JFET [6]

## 4) All questions are compulsory.

- a) Calculate the bandwidth  $f_B$  and capacitance  $C_\pi$  of a bipolar transistor. Consider a bipolar transistor that has parameters  $f_T = 20$  GHz at  $I_C = 1$  mA,  $\beta_0 = 120$ , and  $C_\mu = 0.08$  pF. [6]
- b) Determine the values of  $I_D$  and  $V_{DS}$  for the circuit shown in figure 1. The data sheet for this particular MOSFET gives  $I_D(on) = 10$  mA when  $V_{GS} = V_{DS}$ . [6]

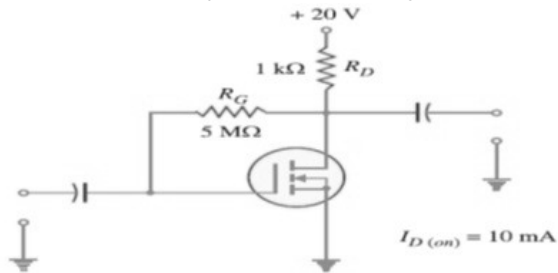


figure 1

## 5) All questions are compulsory.

- a) Explain Darlington transistor configuration [6]
- b) State the effect of various capacitors on frequency response [6]

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