

**GANPAT UNIVERSITY**  
**B.Tech. Semester III (BM), Regular Examination NOV-DEC 2010.**  
**BME 302: LINEAR ELECTRONICS**

Time:- 3 Hours

Marks:- 70

1. **Instructions: Answers to the 2 sections must be written in the separate answer books.**
2. **Figures to the right indicate marks.**
3. **Conventional terms or notations are used.**

**SECTION-I**

- Q-1** (a) Justify: The depletion region is wider near the top and narrower near the bottom in JFET (4)
- (b) Explain FET as a voltage variable resistance. (4)
- (c) Describe with neat diagram JFET small signal model. (4)

**OR**

- Q.1** (a) What are the similarities and differences between a BJT and JFET? (6)
- (b) Enlist the JFET amplifier configuration and explain common source FET amplifier with neat diagram. (6)

- Q.2** (a) Draw the neat diagram of n- channel enhancement type MOSFET. And explain its construction, operation and its characteristics in detail. (6)
- (b) For the fixed bias circuit, find the values of  $I_{DQ}$ ,  $V_{GSQ}$  and  $V_{DS}$ . Assume  $I_{DSS}=8\text{mA}$  and  $V_p=-8\text{V}$ ,  $R_D=2\text{K}\Omega$ ,  $R_G=1\text{M}\Omega$ ,  $V_{DD}=18\text{V}$  and  $V_{GG}=4\text{V}$ . (5)
- (c) Justify: JFET is a voltage controlled device. (1)

**OR**

- Q.2** (a) Draw the neat diagram of P- channel JFET and explain its construction, operation and its characteristics in detail. (7)
- (b) Compare all FET biasing techniques. (5)

- Q.3** (a) Describe with neat diagram the characteristics of silicon controlled rectifier (SCR) in detail. (7)
- (b) Explain with neat diagram common gate FET amplifier. (4)

**SECTION-II**

- Q-4** (a) Explain Transformer coupled Class-A amplifier & derive the efficiency of Class-A amplifier. (12)
- (b) Derive equation that shows relationship between emitter to collector current gain & base to collector current gain for pnp transistor.
- (c) In a two port model,  $R_s=1.5\text{K}\Omega$ ,  $V_s=16\text{mv}$ ,  $V_i=8\text{mv}$ ,  $R_L=0.41\text{K}\Omega$ ,  $A_v=-170$ . Find out  $V_o$ ,  $I_i$ ,  $I_o$ ,  $Z_i$ .

**OR**

Q-4 (12)

- (a) Explain input-output characteristics for Common Emitter configuration.
- (b) What is rectification? Explain in detail Full Wave Rectifier with neat circuit diagram.
- (c) Common base configuration of signal of 10mv is applied across base. Emitter resulting in  $I_E=0.5\text{mA}$ , if  $\alpha=0.98$ . determine  $Z_i$ ,  $V_o$ ,  $A_v$ ,  $Z_o$ ,  $A_i$ ,  $I_B$

Q-5 (12)

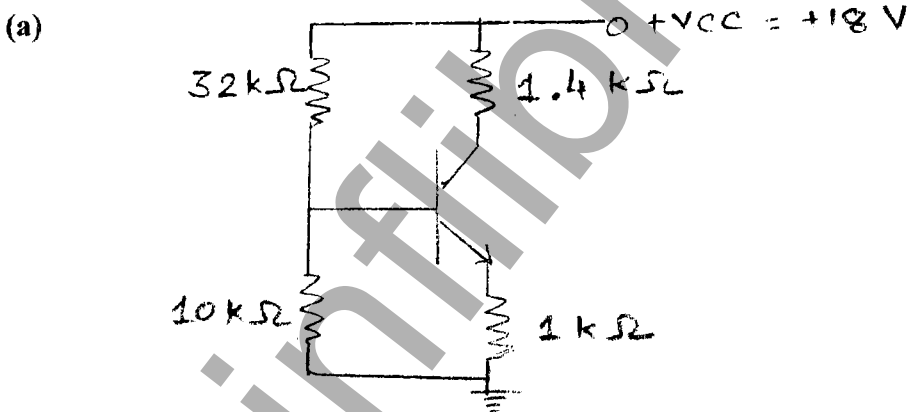
- (a) What is BJT? Draw symbol of npn & pnp transistor. Explain operation of npn transistor.
- (b) What is Darlington connection? Derive equation for AC equivalent & DC bias circuit.
- (c) In dc bias with voltage feedback configuration  $V_{CC}=14\text{V}$ ,  $R_C=6.5\text{K}\Omega$ ,  $R_B=265\text{K}\Omega$ ,  $R_E=1.2\text{K}\Omega$  &  $\beta = 110$  then find out  $I_C$ ,  $I_B$  &  $V_{CE}$ .

OR

Q-5 (12)

- (a) Explain the difference between clipper circuits & clamper circuits.
- (b) Calculate  $\beta_{dc}$  &  $\alpha_{dc}$  for transistor where  $I_C$  is 1.5 mA &  $I_B$  is 26 $\mu\text{A}$ . Also determine the new base current to give  $I_C$  as 5mA.
- (c) Explain effect of negative feedback on gain & bandwidth.

Q-6 (11)



Find out  $V_B$ ,  $V_C$ ,  $V_E$ ,  $I_C$ ,  $I_E$ , and  $V_{CE}$ .

- (b) Explain the a.c. analysis of common collector amplifier with neat circuit diagram & Give one application of it.
- (c) Write a short note on Class C amplifier.

END OF PAPER