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Total Number of Pages : 02

B.Tech  
PEE31102

3<sup>rd</sup> Semester Regular/Back Examination 2018-19

ANALOG ELECTRONIC CIRCUITS

BRANCH : ELECTRICAL

Time : 3 Hours

Max Marks : 100

Q.CODE : E662

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Short Answer Type Questions (Answer All-10) (2 x 10)

- Prove that FET is a voltage controlled device.
- Compare fixed bias and self-bias of BJT.
- Derive an expression for total collector current in CE configuration.
- Give the load line of BJT amplifier if  $V_{CC} = +9V$  and  $R_C = 1.8k$
- Write Shockley's equation. How it is used to design d.c biasing of JFET?
- Differentiate between FET and BJT.
- An amplifier is burst into oscillation when the loop gain  $A\beta=1$ , but for sustained oscillation  $A\beta>1$ , Why so?
- What is linear amplification factor of a transistor if its gain is 100 ?
- What do you mean by CMRR? How it affects the performance of Op-Amp
- What do you mean by distortion in a power amplifier? Which power amplifier gives least amount of distortion?

Part- II

Q2 Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Explain the characteristics of a JFET. With diagram, explain the self-biasing scheme used in JFET.
- Sketch the hybrid  $\pi$ -model of CB amplifier. Derive the relations of gain, input and output impedances.
- Explain the frequency response of BJT amplifier.
- Consider a general feedback system with parameters  $A=10^6$  and  $A_f = 100$ . If the magnitude of A decreases by 20%, what is the corresponding % change in  $A_f$ ?
- Explain how operating is selected in a self-bias configuration of JFET.
- Draw the cascade configuration and explain its operation.
- Find the input resistance, output resistance of an amplifier that employs voltage series feedback.
- Derive the conditions of oscillation in a Wein-bridge oscillator.
- Draw the Op-amp phase shift oscillator and derive the expression for frequency of oscillation.
- Explain how Op-Amp can be used for voltage summing amplifier.
- Draw an emitter follower circuit. What is the type of feedback observed? Find the feedback factor. Determine the voltage gain with and without feedback.
- The pinch-off voltage of a p-channel JFET is  $V_p = -5V$  and  $I_{DSS} = -10mA$ . The drain source voltage  $V_{DS}$  is such that a saturated drain current  $I_{DS} = -15mA$  is maintained. Find the gate source voltage  $V_{GS}$ .

**Part-III**

**Long Answer Type Questions (Answer Any Two out of Four)**

**Q3 a)** Explain the frequency response of BJT amplifier. **(8)**

**b)** Sketch the CE and CB hybrid equivalent model, given  $I_{E(dc)}=1.2\text{ mA}, \beta=120$  and  $r_0=40\text{ K}\Omega$ . **(8)**

**Q4** Briefly explain the principle and operation of N-channel and P-channel MOSFET with its transfer characteristics. **(16)**

**Q5 a)** State and explain the Barkhausen criterion for sustained oscillation. Discuss its importance in operation of an oscillator circuit. **(8)**

**b)** Describe Miller's effect and derive an equation for Miller input and output capacitance. **(8)**

**Q6** Draw the circuit diagram of a class-A transformer coupled power amplifier using an npn transistor. This amplifier drives a 16 ohm speaker through a 4:1 transformer, using a power supply of  $V_{CC}=36\text{V}$ , the circuit delivers 2 watts to the load. Calculate **(16)**  
a) AC power across transformer primary  
b) AC voltage across the load  
c) the RMS value of load current