

**SANT GADGE BABA MARAVATI UNIVERSITY, AMRAVATI Summer  
Examination 202 Credit Point0 HVPM's College of Engineering and  
Technology, Amravati Department of Electronics & Tele Communication  
Engineering Bachelor of Engineering Sem:-III**

**Subject:-Electronics Devices and Circuits**

**Code:-3ET03**

**Instructions:-**

**1) Solve any two questions**

**2) All question carry equal marks**

**1.**

- a) A silicon diode has 5 mA in forward bias at 0.7V. Calculate its reverse saturation current. Now if its forward voltage is increased to 0.75V, calculate new current in diode at room temperature. **(2 Credit Point)**
- b) What are the drawbacks of the collector to base bias circuit? How can it be removed? Explain, with circuit diagram. **(2 Credit Point)**
- c) Explain the principle of oscillators. What are the conditions for sustained oscillations? **(2 Credit Point)**
- d) Why does the cascading of stages increase the gain-band width product of an amplifier? **(2 Credit Point)**
- e) What is meant by harmonic distortion in power amplifiers? Show that the total power in power amplifier is. **(1 Credit Point)**  
$$P = (1 + D^2)P_1$$

Where, D is total distortion  
P<sub>1</sub> is the output power due to  
Fundamental component of the distorted signal.
- f) What are the biasing schemes available to achieve the required bias in JFET? Explain any one in detail. **(1 Credit Point)**

**2.**

- a) What are the capacitances associated with the PN junction diode? Explain in detail. **(2 Credit Point)**
- b) A single stage CE amplifier has a BJT with  $h_{ie}=1.2k\Omega$ ,  $h_{re}=2 \times 10^{-4}$ ,  $h_{fe}=60$ ,  $h_{oe}=30\mu A/V$  along with  $R_S=900\Omega$ ,  $R_L=1K\Omega$ . Calculate  $A_i$ ,  $A_{is}$ ,  $A_{vs}$ ,  $R_i$  and  $A_p$ . **(2 Credit Point)**
- c) Explain the effect of feedback on Bandwidth of amplifiers. **(2 Credit Point)**
- d) What is the necessity of Darlington connection? Explain the biasing problem associated with it. How is it overcome? **(2 Credit Point)**
- e) What is cross over distortion? Explain any one method to overcome it. **(1 Credit Point)**
- f) An n-Channel JFET has  $I_{DSS}=8mA$  and  $V_p=-5V$ . Determine the minimum values of  $V_{DS}$  for pinch off region and the drain current  $I_{DS}$  for  $V_{GS} = -2V$ . **(1 Credit Point)**

**3.**

- a) In a bridge rectifier, the transformer is connected to 220V, 50Hz mains and the turns ratio of the step down transformer is 11:1. Assuming the diodes to be ideal, find  
i) The voltage across the load      ii)  $I_{dc}$       iii) PIV **(2 Credit Point)**
- b) Draw and explain common base configuration in detail. **(2 Credit Point)**

- c) A tuned collector oscillator circuit has a fixed inductance of 100  $\mu\text{H}$  and has to be tunable over the frequency band of 500 KHz to 1500KHz. Find the range of variable capacitor to be used. **(2 Credit Point)**
- d) A cascaded amplifier uses 3 stages having the individual gain 10, 20 and 40 respectively. What is the overall voltage gain in dB? **(2 Credit Point)**
- e) What is meant by harmonic distortion in power amplifiers? Show that the total power in power amplifier is.  
(7)  
 $P = (1 + D^2)P_1$   
Where, D is total distortion  
 $P_1$  is the output power due to  
Fundamental component of the distorted signal. **(1 Credit Point)**
- f) Explain with the help of circuit diagram the working of UJT relaxation oscillator. **(1 Credit Point)**

#### 4.

- a) Explain the importance of filters with neat diagrams. **(2 Credit Point)**
- b) Draw the circuit for collector to base bias and derive the stability factor S for the same. Also explain how this circuit provides stability against change in temperature. **(2 Credit Point)**
- c) Derive the expression of input and output resistance in Voltage-Series feedback. **(2 Credit Point)**
- d) Explain the necessary of impedance matching in amplifier. **(2 Credit Point)**
- e) Explain the operation of class B push pull amplifier with circuit diagram and waveforms. **(1 Credit Point)**
- f) Explain the construction, operation and  $V_{DS} - I_D$  and transfer characteristics of n-channel depletion type MOSFET. **(1 Credit Point)**