

B.E. Instrumentation Engineering (Model Curriculum) Semester - III
IN303M - Electronic Devices & Circuits

P. Pages : 2

Time : Three Hours



GUG/S/23/14011

Max. Marks : 80

- Notes :
1. Same Answer book must be used for each section.
 2. All questions carry marks as indicated.
 3. Due credit will be given to neatness and adequate dimensions.
 4. Diagrams and Chemical equation should be given wherever necessary.
 5. Illustrate your answers wherever necessary with the help of neat sketches.

1.
 - a) Discuss the behaviour of junction in forward bias & reverse bias mode and draw its volt-ampere characteristics. 8
 - b) For a full wave rectifier with center tapped transformer, find the average, RMS and peak values of current through the diode, if the voltage across half of the secondary is $15 \sin 314t$. Also calculate the PIV of the diode. Given $R_L = 1k\Omega$ and assume diode is ideal. 8

OR

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| 2. | <p>a) Write a short note on-</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>i) Positive clipping</p> <p>iii) Capacitor filter</p> </div> <div style="width: 45%;"> <p>ii) Tunnel diode</p> </div> </div> | 8 |
| b) | <p>A π filter is a full wave rectifier uses $C_1 = C_2 = 100\mu\text{f}$ and $L=10\text{H}$. The load current is 0.5A at 100V d.c. Find the ripple factor.</p> | 8 |
| 3. | <p>a) Give the circuit arrangement and graph for obtaining the input & output characteristic of transistor in common emitter configuration.</p> | 8 |
| b) | <p>A transistor has $I_B = 105\mu\text{A}$ and $I_C = 2.05\text{mA}$</p> <p>Find</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>i) β of transistor</p> <p>iii) Emitter current I_E</p> </div> <div style="width: 45%;"> <p>ii) α of transistor</p> <p>iv) Now, if I_B changes by +27 mA and I_C changes by +0.65mA Find the new value of β.</p> </div> </div> | 8 |

OR

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|-----------|----|---|----------|
| 4. | a) | Elaborate the voltage divider bias method of transistor and also find its stability. | 8 |
| | b) | Compare CE, CB, CC configuration of transistor for CE configuration, prove that $I_C = \beta I_B + (1 + \alpha) I_{CO}$. | 8 |
| 5. | a) | Derive an expression of transconductance. | 4 |
| | b) | Compare FET with BJT. | 4 |

- c) A 2N 5486 JFET has values of $V_{GS} \text{ (off)} = -2V \text{ to } -6V$ and $I_{DSS} = 8mA$. Plot the min & max transconductance curves for the device. 8

OR

6. a) Discuss with the aid of diagram, the essential difference between enhancement mode FET's & depletion mode FET's. 8
- b) The N channel E-MOSFET used in a common source amplifier has $I_D \text{ (ON)} = 4mA$. at $V_{GS} \text{ ON} = 10V$. $V_{GS} \text{ off} = 4V$ and $g_m = 5000 \mu S$. Determine V_{GS} , I_D , V_{DS} & V_O . 8
7. a) A transistor rated for a maximum collector dissipation of 100mw operates a single-ended class-A output stage from a 10V supply. Calculate the approximate values of. 8
- i) Max undistorted a.c. output power
- ii) The Q value of current
- iii) Turn ratio of output transformer. If the load resistance is 16Ω . Assume overall and collector efficiency = 0.5.
- b) Justify how two complementary transistor in class-B push pull amplifier acts simultaneously as phase inverter and on output push pull pair. 8

OR

8. a) What is cross over distortion? How to avoid it. 4
- b) Why power amplifier is called as large signal amplifier? Explain it briefly. 4
- c) Prove that in case of push pull class-B amplifier the efficiency at the time of maximum power dissipation is just 50%. 8
9. a) Obtain the expression for frequency of oscillation for a phase shift oscillators and show that gain of an amplifier must exceed 20 in this oscillator. Give the feedback factor. 8
- b) A crystal has the following parameter $L = 0.33H$ $C_1 = 0.065pf$, $C_2 = 1.0pf$ and $R = 5.5k\Omega$. Find The series resonant frequency and Q factor for the crystal. 8

OR

10. a) What is the effect of voltage series negative feedback in the following performance measure of a BJT amplifier. 8
- i) Input resistance ii) Output resistance
- iii) Band width iv) Distortion and noise
- v) Gain stability
- b) An amplifier has a voltage gain of 100 and a distortion of 10% calculate the feedback factor required to reduce the distortion to 2% what is the gain of the feedback amplifier. 8
