

**NM-102**

December-2015

B.Sc., Sem.-III

**Core Course-201 : Electronics****Time : 3 Hours]****[Max. Marks : 70**

- Instructions :** (1) All questions carry equal marks.  
 (2) Symbols used here have usual meanings.

1. (a) Draw the simplified low frequency model of CE amplifier for tilt calculation. Discuss the low frequency response to a square wave and derive the formula for sag or tilt. 7

**OR**

Draw Hybrid  $\pi$  model for a transistor in CE connection. Explain hybrid  $\pi$  capacitance, base spreading resistance and transistor transconductance.

- (b) Draw the circuit of transformer coupled transistor amplifier. Obtain an expression of mid frequency stage gain  $A_i$ . 7

**OR**

Discuss high frequency response of a transformer coupled amplifier.

2. (a) Write the types of negative feedback. Draw neat and clean diagram of current series negative feedback and explain. Derive the formula for input resistance, voltage gain and feedback factor. 7

**OR**

Write advantages of negative feedback. Explain one of them. Give the general theory of feedback and obtain an equation for voltage gain with feedback.

$$A_{vf} = \frac{A_v}{1 - kA_v}$$

- (b) An amplifier with  $3.3 \text{ k}\Omega$  input resistance and  $40 \text{ k}\Omega$  output resistance has a voltage gain of 60. The amplifier is now modified to provide 10% negative voltage feedback in series with the input.

Calculate (i) voltage gain with feedback. (ii) Input resistance with feedback (iii) output resistance with feedback. 7

**OR**

An amplifier's total harmonic distortion is reduced from 10% to 2% when 5% negative feedback is used. (a) What was the initial voltage gain of amplifier when distortion was 10% ? (b) What was the gain with 2% distortion ? (c) How much distortion would there be if the gain with feedback were reduced to 12 ?

3. (a) Explain the basic structure of N channel JFET. Draw the characteristics curves of JFET. Explain ohmic region and pinch off region. Draw the symbol of p channel JFET. 7

**OR**

What is MOSFET ? Explain the enhancement MOSFET. With drain characteristic and transfer curve for an N channel enhancement type of MOSFET.

- (b) (i) Explain characteristics parameters of the FET and obtain an equation  $\mu = r_d \cdot g_m$ . 7
- (ii) For 2N 38/9 FET the amplification factor is 50 and change in drain current is 25 mA with change in drain to source voltage is 4 volt. Determine the value of transconductance with proper unit.

**OR**

Draw cross sectional view of dual gate N channel depletion type MOSFET and explain. Draw the symbol of dual gate MOSFET.

4. (a) Draw neat and clean diagram and waveforms for full-wave rectifier with inductor filter. Obtain an equation for ripple factor. 7

**OR**

Draw the circuit diagram of transistor shunt regulator and explain its working.

- (b) Draw the circuit diagram for full-wave rectifier with capacitor filter and obtain an equation for ripple factor. 7

**OR**

What is voltage regulation ? Explain line regulation and load regulation with appropriate diagrams. Write two disadvantages of Zener diode shunt regulator.

5. Answer in short : 14

- (1) Write Miller effect.
- (2) Is the overall value of  $f_1$  for cascaded amplifier higher or lower than the value of  $f_1$  for any of the individual stage ?
- (3) Why is current gain larger in transformer coupled amplifier ?
- (4) Write disadvantage of negative feedback.
- (5) What is loop gain ?
- (6) How much negative feedback is used in emitter follower circuit ?
- (7) Name the types of negative feedback circuit in which there is increase in input and output resistance.
- (8) Write two advantages of FET.
- (9) Draw the symbol of depletion type N channel MOSFET.
- (10) Give the full form of VVR.
- (11) What is  $I_{GSS}$  ?
- (12) Why bleeder resistor is used in L-C circuit ?
- (13) Define current stabilization ratio.
- (14) What is meant by PIV of a diode ?