Bihar Engineering University, Patna
End Semester Examination -2023

Course: B.Tech	*Semester: IV*	*Time: 03 Hours*
Code: 110401	*Subject: Analog Electronics*	*Full Marks: 70*

Instructions:-

(i) The marks are indicated in the right-hand margin.
*(ii) There are **NINE** questions in this paper.*
*(iii) Attempt **FIVE** questions in all.*
(iv) Question No. 1 is compulsory.

Q.1 Choose the correct answer of the following (any seven Question only): **[2 x 7 = 14]**

(a) The resistance in hybrid-pi model is used for
(i) Analysis of BJT at high frequency (ii) analysis of BJT at low frequency
(iii) Analysis of BJT for feedback (iv) analysis of BJT for large signal

(b) Diode is a ..... device
(i) Unidirectional (ii) Bidirectional
(iii) Non-linear (iv) both a & c

(c) How is the transconductance at saturation related to the pinch off voltage of the JFET?
(i) Inversely proportional
(ii) Directly proportional
(iii) Inverse-squarely related
(iv) Directly and proportional to square of the pinch-off voltage

(d) A Ripple factor of half wave rectifier is _____
(i) 1.414 (ii) 1.21
(iii) 1.3 (iv) 0.48

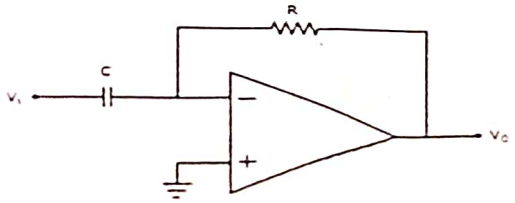
(e) The overall gain of multiple amplifiers in cascade can be expressed as _____ (A1, A2, A3 are individual gains)
(i) A1-A2-A3
(ii) A1+A2+A3
(iii) A1/A2*A3
(iv) A1*A2*A3

(f) In an ideal op-amp, which is not true?
(i) Open loop voltage gain is infinite (ii) Input resistance is infinite
(iii) Slew rate is infinite (iv) CMRR is zero

(g) The ratio that quantifies the device's ability to reject the common mode signals is called _____.
(i) Common mode rejection ratio (ii) Gain ratio
(iii) Common mode ratio of reference (iv) None of the above

(h) What type of a device is MOSFET?
(i) Current-controlled
(ii) Voltage-controlled
(iii) Voltage-controlled Current source
(iv) Voltage-controlled Voltage source

(i) Identify the circuit displayed below



(i) Integrator (ii) Differentiator

(iii) Adder (iv) Multiplier

(j) Which of the following BJT terminal controls the current flow?

(i) Base (ii) Collector

(iii) Emitter (iv) Drain

Q.2 What is PIV in diode? Derive RMS value and efficiency in half wave and full wave rectifier. **[14]**

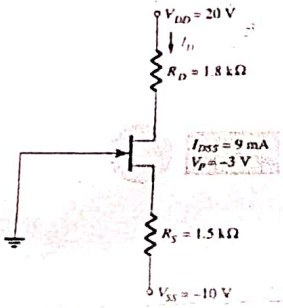
Q.3 Discuss various biasing methods used in BJT. Also write your conclusion that which biasing method is best, justify it with stability factor. **[14]**

Q.4 Explain the working of depletion type MOSFET. Discuss why wedge shaped channel appears if Drain to source voltage increases at constant Vgs. **[14]**

Q.5 Determine the following

(a) I_{DQ} and V_{GSQ} **[7]**

(b) V_{DS}, V_D, V_S. **[7]**



Q.6 (a) Write the properties of ideal op-amp. Define CMMR, Virtual ground & slew rate. **[7]**

(b) Explain inverting mode, non- inverting mode, summing amplifier and integrator circuit in op-amp. **[7]**

Q.7 (a) Explain the mechanism of avalanche breakdown and zener breakdown. **[7]**

(b) How signal diode is differ from zener diode. **[7]**

Q.8 What is difference between active filter and passive filter? Design active low pass filter using op-amp and sketch output. **[14]**

Q.9 Find I_E and I_C. Assume β is very large