SC

No. of Printed Pages : 2

SEAT No.

[40/A-10]

Sardar Patel University

BSc [Semester- V] CBSC (regular) Subject Physics
Course Code No: US05CPHY05
Subject/Course Title: Analog Devices and Circuits

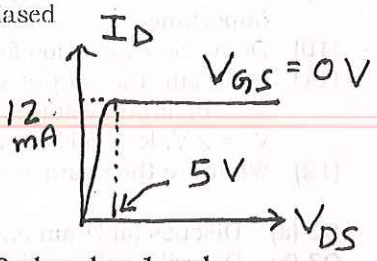
Thursday, Date 01-11-2018 **Time: 10 am to 1 pm** **Total Marks-70**

Q-1 Multiple Choice Questions: [Attempt all] [10]

(1) **FET stands for**
(a) Field Effect Transformer (b) Full Effect Transistor
(c) Field Energy Transfer (d) Field Effect Transistor

(2) **A JEET has high input impedance because _____.**
(a) It is made of semiconductor material (b) input is reversed biased
(c) of impurity atoms (d) None of the above

(3) **In a given characteristic of a JFET, the gate-source cutoff voltage $V_{GS(off)}$ =___V.**



(a) +12 (b) -12
(c) +05 (d) -05

(4) **The typical h-parameters of an amplifier are h_i = 6500 ohm, h_r = 1 and h_f = - 245. Identify the configuration of the amplifier.**
(a) CC (b) CE
(c) CB (d) Both (a) and (b)

(5) **If $r_{bb'}$= 900 ohm and $r_{b'e}$ = 100 ohm, then h_{ie} = _____ohm**

(a) 800 (b) 1000 (c) 90000 (d) 9

(6) **The correct relationship is (are)**
(a) $f_T \approx \frac{g_m}{2\pi C'_{be}}$ (b) $f_T = h_{fe} f_\beta$
(c) $f_T = h_{fb} f_\alpha$ (d) All of These

(7) **Power amplifiers handle ____ signals compare to voltage amplifiers.**
(a) Small (b) Very small (c) Large (d) None of these

(8) **In class A operation, the operating point is generally located __ of the d.c. load line.**
(a) At cut off point (b) At the Middle (c) At saturation point (d) None of These

(9) **If R_f = 1MΩ and R_i = 2 KΩ, the voltage gain of an ideal non-inverting mode OpAmp summing amplifier is equal to _____.**
(a) 500 (b) 501 (c) -500 (d) -501

(10) **If A_{dm} = 2500 and A_{cm} = 0.25, the CMRR is .....**

(a) 1225 (b) 10000
(c) 80 dB (d) Both (b) and (c)

(1)

Q2 Answer any TEN questions in short. [20]

(1) Describe Gate bias.
(2) Draw a normalized transconductance curve of FET. If a JFET has $V_{GS(off)}$ =-6 V and I_{DSS} = 20 mA. What is the drain current at the half cutoff point?
(3) Draw a circuit diagram of multiplexing and explain the working of it.
(4) Discuss the effect of (a) coupling capacitor and (b) emitter bypass capacitor on low frequency response.
(5) Discuss the effect of source resistance on high frequency response.
(6) Explain importance of tuned amplifier also discuss classification of small signal tuned amplifiers.
(7) Explain cross over distortion. What it is caused by and how it is overcome.
(8) Draw circuit diagram of transistor phase inverter. What are the limitations of the circuit?
(9) Draw a labeled diagram of class AB push-pull amplifier and explain its importance.
(10) Derive an expression for the voltage gain of ideal inverting Op-Amp.
(11) Calculate the output voltage of an OpAmp inverting adder for the following sets of input voltages and resisters. In all cases R_f= 2000 KΩ V_1 = -4 V, V_2 = 2 V, R_1 = 500 KΩ and R_2 = 1000 KΩ.
(12) What are the characteristics of an ideal operational amplifier?

Q3 (a) Discuss (a) Drain and (b) Transconductance curves of FET. [7]
Q3 (b) Describe voltage divider bias circuit of JFET. [3]

OR

Q3 (a) Write a note on (a) JFET Amplifier and (b) Source follower. [7]
Q3 (b) Write a note on CMOS. [3]

Q4 Draw an ac hybrid equivalent amplifier circuit and derive amplifier equations in term of the h-parameters. [10]

OR

Q4 Define and explain FOUR h-parameters in details. [10]

Q5 (a) Describe Class B push pull amplifier. [7]
Q5 (b) Write a short note on Class A direct coupled resistive load. [3]

OR

Q5 (a) Write a note on harmonic distortion. How Class A push-pull amplifier minimize such distortion? [7]
Q5 (b) Explain class A transformer coupled resistive load. [3]

Q6 (a) Drawing AC equivalent circuit of differential amplifier and hence derive expression for gain of the amplifier in difference mode configuration. [7]
Q6 (b) Define and explain the following OpAmp parameters: [3]
(a) Input offset current (b) Input bias current and (c) Input offset voltage.

OR

Q6 (a) Drawing AC equivalent circuit of differential amplifier and hence derive expression for gain of the amplifier in common mode configuration. [7]
Q6 (b) Describe use of an Op-Amp as current-to-voltage converters. [3]