VP & RPTP SCIENCE COLLEGE
Vallabh Vidyanagar
First Internal Test
BSc [Semester - V] Subject: Physics Course: US05CPHY05
Title: Analog Devices and Circuits
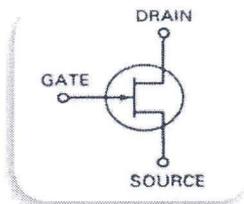
Date: 6-10-2018, Saturday   Time: 10 am to 12 noon

Total Marks 50

Q-1   Multiple Choice Questions: [One mark each]   8

[1] is a symbol of _____

(a) n- channel FET   (b)   p-channel FET
(c) E-MOSFET   (d)   D-MOSFET

[2] _____ is used to bias the FET in ohmic region.

(a) Voltage-divider bias (b) Self-bias (c) Gate bias (d) Source bias

[3] The lower cut off frequency of CE transistor amplifier is independent only upon:
(a) C_e (b) C_c (c) R_s (d) R_e

[4] If h_{fe}= 100, h_{fb}=0.97, f_α =330 MHz and f_β= 300 MHz, the gain bandwidth product (f_T) in CB configuration is equal to _____.
(a) 320.1 MHz   (b) 291 MHz   (c) 30000 MHz   (d) 33000 MHz

[5] Conversion efficiency of a class-A CE power amplifier with direct coupled resistive load is _____.
(a)   25 %   (b)   50 %   (c)   78.5 %   (d)   100 %

[6] The harmonic distortion is due to ____nature of the ____ devices.
(a)   linear, active   (b)   nonlinear, active
(c)   nonlinear, passive   (d)   linear, passive

[7] If R_f = 10 KΩ and R = 2 KΩ, the voltage gain of an ideal inverting mode OpAmp is equal to _____.
(a) 20   (b) -20   (c) 5   (d) -5

[8] In which application of OpAmp, a diode is connected as feedback element with input element is resistor?
(a) Summing amplifier   (b) Difference amplifier
(c) Logarithmic amplifier   (d) Weighted amplifier

Q-2 Answer the following questions in short. 10
(Attempt any FIVE questions) [Two marks each]:
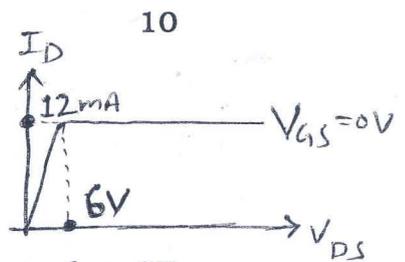
[1] Write any four advantages of FET compared to BJT.
[2] In a given drain characteristic of JFET, $I_{DSS}=$ ___, V_P
___, ohmic resistance R_{DS} = ___ and the gate-source
cutoff voltage $V_{GS\,(off)}$ =_____.

[3] What are the factors on which high frequency response of a CE
amplifier depends? Explain it with necessary equations.
[4] Discuss classification of small signal tuned amplifiers.
[5] Define conversion efficiency of an amplifier.
[6] Draw labeled circuit diagram of other class B push pull amplifier
without transformer.
[7] What are the characteristics of an ideal operational amplifier?
[8] List Op-Amp parameters and define any two.

Q-3 (a) Draw and describe transconductance curves of FET. 5
A2N5459 has $V_{GS(off)}$ = -8 V and I_{DSS} = 16 mA. What is the
drain current at the half cutoff point?
Q-3 (b) Write a note on MOSFET. 3

OR

Q-3 (a) List any FIVE applications of JFET and describe any two. 5
Q-3 (b) List name of the biasing circuits which bias JFET in the 3
active region and describe any one.

Q-4 Define and explain h-parameters of the transistor. 8

OR

Q-4 Derive the following amplifier equations: 8
(1) Current gain (2) Input resistance and (3) Voltage gain.

Q-5 (a) Describe an operation of class A push pull amplifier. 5
Q-5 (b) Explain how class A push pull amplifier removes all even 3
harmonics?

OR

Q-5 (a) Write a note on class B push pull amplifier. 5
Q-5 (b) Draw circuit diagram of transistor phase inverter and 3
describe working of it.

Q-6 (a) Draw a circuit diagram of differential amplifier having dual 5
input balanced output configuration. Derive expressions for
Q-point of the circuit.
Q-6 (b) Describe use of Op-Amp as integrator. 3

OR

Q-6 (a) Write a note on the noninverting summing amplifier using 5
Op-Amp. Derive an expression for its voltage gain
Q-6 (b) Calculate the output voltage of an OpAmp inverting adder for 3
the following sets of input voltages and resisters. In all cases
R_f= 1000 KΩ V_1 = -3 V, V_2 = 1 V, $R_1 = R_2 = 500$ KΩ.

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