CLASS: BTECH /IMSc(IPH)
BRANCH: ME/CIVIL/CHEMICAL/PIE/BIOTECH/IFT/IPH

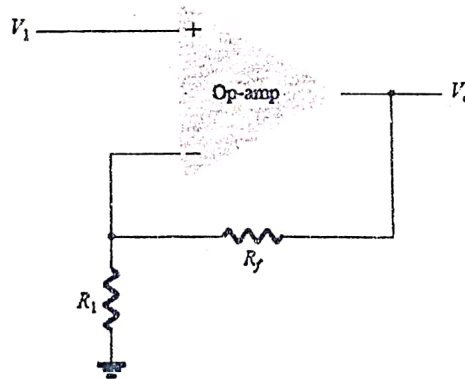SUBJECT: EC101 BASICS OF ELECTRONICS AND COMMUNICATION ENGINEERING
FULL MARKS: 50

TIME: 3 Hours

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Explain a PN Junction and describe how depletion region is formed with suitable diagrams.	[5]	1	2
Q.1(b)	A Silicon PN junction diode operates at 300 K. If the applied forward bias is increased, then the diode current I_D is doubled. Calculate the increase in the bias voltage. Assume Diode current, I_D >> Reverse Saturation Current, I_S.	[5]	1	2
Q.2(a)	Elaborate the hybrid model for the common emitter amplifier with a diagram. Determine the four hybrid parameters from input and output characteristics of CE amplifier.	[5]	2	3
Q.2(b)	Draw the symbols of n-channel JFET, n-channel depletion type MOSFET and p-channel enhancement type MOSFET. Also, sketch the transfer characteristics for an n-channel depletion type MOSFET with I_{DSS} = 10 mA and V_P= -4 V.	[5]	2	2
Q.3(a)	Explain the circuit connection of a Hartley Oscillator and find the expression for frequency of oscillation.	[5]	3	2
Q.3(b)	Define slew rate. Also, determine the gain of the following amplifier if R_1= 100 Ω and R_f=1 KΩ.	[5]	3	2

Q.4(a)	Minimize the following function and implement using only NAND gate. $f=\Sigma m(1,2,4,5,6,7)$.	[5]	4	3
Q.4(b)	Derive the expression for sum and carry of the full adder and implement the circuit.	[5]	4	3
Q.5(a)	Explain the different elements of an electronics communication system with a neat block diagram. Determine the required minimum antenna height for transmitting a voice signal of 1 KHz.	[5]	5	2
Q.5(b)	Calculate the minimum and maximum amplitude of an amplitude modulated wave represented by the expression, $s(t)=7.5(1+ 0.6 \cos6280t) \cos(10^6\pi t)$. Also, determine the frequence components present in the AM wave.	[5]	5	3

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