



MODEL QUESTION PAPER					
Principles of Electronics Engineering					
Category: (Common to all Programs)					
Course Code	:	22ES14C	SEE	:	100 Marks
			SEE Duration	:	3.00 Hours

INSTRUCTIONS:

- Answer all the questions from Part-A
- Answer any 5 full questions from Part-B choosing one from each choice.(Question number 2 is compulsory)

PART-A						
		Marks	CO	BTL	PO	PI CODE
1.1	The values of β that correspond to α value of 0.985 and 0.992 respectively are _____ and _____.	1	1	1	1	1.1.1
1.2	If a PNP transistor is operating as an open switch, its base-emitter junction is _____ biased.	1	1	2	1	1.2.1
1.3	Three amplifiers with voltage gain of 20, 100 and 2000 are connected in cascade, the overall gain in dB = _____.	1	2	1	2	2.2.1
1.4	In a regulated DC power supply the output voltage drops from 12V to 11.8V when the input voltage reduces by 10%. The line regulation is _____.	1	1	1	1	1.3.1
1.5	BJT is _____ controlled device.	1	1	2	1	1.1.1
1.6	The lower cut off frequency of an RC coupled amplifier is 300Hz.It has a voltage gain of 70 at 300Hz and has a bandwidth of 25KHz.The mid frequency gain of the amplifier = _____.	1	2	3	2	2.4.3
1.7	An NPN transistor has $I_{co} = 25\text{nA}$, $I_B = 0$, $V_{CE} = 4\text{V}$ and $I_C = 20\mu\text{A}$. The value of β is _____.	1	2	2	1	1.5.1
1.8	In NPN transistor, if $V_B = 3\text{V}$, $V_E = 2\text{V}$, $V_C = 1\text{V}$, the transistor is operating in _____ region.	1	1	1	2	2.3.1
1.9	Three amplifiers of voltage gains 20dB, 26dB and 32dB are cascaded to obtain an output voltage of 2V. Calculate the input voltage needed.	1	2	2	2	2.3.2
1.10	The Slew rate of an Op-Amp is $3\text{V}/\mu\text{sec}$ with a peak value of voltage as 2V. Calculate the maximum output frequency so that the output is not distorted.	1	2	2	2	2.4.3
1.11	If one of the input to a 2-input EX-NOR gate is connected to 0, then it can be used to _____.	1	3	3	1	1.4.1
1.12	The canonical sum of product form of the function $y(A,B) = A + B$ is _____.	1	3	3	1	1.2.1
1.13	Prove that $AB + BC + B\bar{C} = AB + C$	1	2	3	1	1.4.1



1.14	The gain of a voltage follower is _____	1	2	2	1	1.1.1
1.15	An op-Amp has a differential gain of 86dB and Common mode gain of 20dB. The CMRR in dB is _____	1	1	1	1	1.3.1
1.16	The minimum number of NAND gates required to realize XOR gates is _____	1	1	2	1	1.2.1
1.17	The frequency range of FM wave is _____.	1	1	1	1	1.1.1
1.18	In a 3 variable K-map, if all the cells contain 1's then the output is _____	1	1	2	1	1.1.1
1.19	How does the reduction in the height of the antenna and multiplexing of signals helps the process of modulation in communication system?	1	1	1	2	1.2.1
1.20	Differentiate between Sensors and Transducers	1	1	1	1	1.3.1



PART-B						
		Marks	CO	BTL	PO	PI CODE
2 a.	Briefly explain the three regions of operation of a BJT. Draw the output characteristics of a BJT.	4	1	1	1	1.4.1
b.	Explain the working of RC coupled amplifier with the circuit diagram. Draw its frequency response.	6	1	2	1	1.3.1
c.	Design the Zener regulator for the give specification. V_{in} varies from 6.6V to 9.9V R_L varies from 66Ω to 165Ω $V_z=3.3V$ $I_z(\min)=10mA$ $P_d(\max)= 660mW$	6	4	3	4	4.1.3
3a.	Explain the operation of RC phase shift oscillator with a neat diagram and also mention the gain equation.	6	1	1	1	1.2.1
b.	An amplifier has a gain of 50 dB. The bandwidth of 250KHz, distortion of 12%, an input impedance of $30K\Omega$, and an output impedance of $2K\Omega$. If the voltage series negative feedback of 2.9% is given to this amplifier, calculate the gain, input impedance, output impedance, bandwidth, and distortion of the amplifier with negative feedback.	6	3	3	2	2.2.3
c.	List at least four important characteristics of an ideal op-amp and indicate their typical values for a general purpose commercial op-amp.	4	1	1	1	1.3.1
OR						
4 a.	Prove that the stability of the gain of an amplifier improves with negative feedback by a factor $(1+A\beta)$ where A is the open loop gain of the amplifier and β is the feedback factor.	6	2	2	1	1.2.1
b.	Design an adder circuit using an op-amp to obtain an output expression. $V_0=2(0.1 V_1+0.5 V_2+20 V_3)$ where V_1, V_2, V_3 are the inputs. Assume the value of feedback resistor as $10K\Omega$.	5	4	3	3	3.1.6
c.	Draw the circuit of an inverting amplifier and explain the working of the same with suitable expressions	5	1	1	1	1.2.1
5 a.	Simplify the logic expression using K map and implement the logic circuit using NAND Gate. $F = \sum m(0,1,2,3,5,7,8,9,10,12,13)$	6	2	3	2	2.4.3
b.	Write the truth table for SUM and CARRYOUT of a full adder. From the truth table, obtain the logic expressions for the same and then realize the full adder using 2 half adders.	6	2	2	2	2.3.1



c.	State and Prove Demorgan's theorems.	4	1	1	1	1.1.1
	OR					
6 a.	Simplify the following expressions: 1 $Y = (A + B)(A + \bar{B})(\bar{A} + B)$ 2 $Y = XY + XYZ + XY\bar{Z} + \bar{X}YZ$	6	2	4	2	2.4.3
b.	A logic circuit has three inputs A, B and C and two outputs X and Y. The first output X is at logic 1, when two or more of the inputs are at logic 1. The second output Y is at logic 1, when only one of the inputs is at logic 1. Write the truth table, logic expressions for X and Y and realize the logic circuits using NAND gates only.	6	3	4	3	3.4.1
c.	Realize the EX-OR function using minimum number of NAND gates only.	4	2	1	1	1.4.1
7 a.	With the help of a block diagram representation explain the process in communication system.	8	1	1	1	1.3.1
b.	Write at least four differences between AM and FM system.	8	1	1	1	1.2.1
	OR					
8 a.	With the help of a block diagram representation describe Super heterodyne receiver.	8	1	1	1	1.3.1
b.	Differentiate between Microprocessor and Microcontroller	8	1	1	1	1.2.1
9 a.	Describe 1. Piezo electric transducer 2. Hall effect Transducer	8	1	1	1	1.1.1
b.	Biomedical sensors are widely used to monitor various parameters of the human body, Mention any such 04 parameters of human body for which Biomedical sensors can be used also mention the details of the sensors used for measuring these parameters?	8	4	3	4	4.1.2
	OR					
10 a.	Based on the conditions of requirement in an agriculture industry for maintaining the amount of water vapour in the crop, which sensor do you suggest would be the right one for this applications, Explain the same sensor with its working principle.	8	3	4	4	4.2.1
b.	Compare and contrast Active and Passive transducers, Interpret the working principle of transducer based on the principle of mutual Inductance	8	2	2	1	1.3.1