Model Question Paper-I (18EC42) with effect from 2021

USN | | | | | | | | | | |

Fourth Semester B.E Degree Examination
ANALOG CIRCUITS

TIME: 03 Hours **Max. Marks: 100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each module.

		Module -1	**Marks**
Q.01	a	Explain the voltage divider biasing for BJTs using single power supply. How does R_E provides a negative feedback action to stabilize the bias current with necessary supporting equations.	**08**
	b	For CE amplifier circuit V_{BE} is adjusted to yield dc collector current of 1mA. Let Vcc=15V, Rc=10KΩ and B=150. Find voltage gain. If Vbe=0.002 sinwt volt Find Vc(t) and Ib(t).	**08**
	c	A BJT having B=100 is biased at dc collector current of 0.5mA. Find the value of gm and r∏ at base point.	**04**
		OR	
Q.02	a	Draw the small signal equivalent circuit model for MOSFET and obtain the expression for voltage gain.	**06**
	b	Design a circuit to fix V_G and bias using Rs and voltage divider arrangement to establish drain current of 0.5mA. The MOSFET is specified to have Vt=1V k(W/L)=1mA/V^2.	**08**
	c	Mention relation between r∏ and r_e.	**06**
		Module-2	
Q. 03	a	With neat circuit diagram and ac equivalent circuit derive expressions for Rin, Av and Ro for a CS amplifier with bypassed source resistance.	**07**
	b	Obtain the expression for Ri, Av and Ro for a common drain amplifier using suitable ac equivalent circuit.	**07**
	c	Explain biasing of MOSFET by fixing V_{GS}	**06**
Q.04	a	Obtain the low frequency response of CS amplifier.	**10**
	b	Draw the circuit of a RC phase shift oscillator using MOSFET and explain the working.	**06**
	c	A 2MHz quartz crystal is specified to have L=0.5H, Cs=0.012pF, Cp=4pF, R=120ohm Find fs and fp.	**04**
		Module-3	
Q. 05	a	Explain Gain Densitivity and effect on Bandwidth with the application of negative feedback in amplifiers.	**07**
	b	A feedback amplifier produces an output of 10V with an input of 1V. When the feedback is removed to produce same output, input needed is 0.2V.. Find the voltage gain with and without feedback and feedback factor.	**07**

	c	Define different types of power amplifiers.	**06**
		OR	
Q. 06	a	With a neat block diagram explain the working of a voltage series feedback amplifier. Obtain the expression for gain, Input resistance and output resistance with feedback.	**12**
	b	Draw the circuit of a transformer coupled Class-A power amplifier. Prove that the maximum conversion efficiency is 50%.	**08**
		Module-4	
Q. 07	a	Derive the relevant expressions for exact and approximate voltage gain and input resistance for a non inverting amplifier using op-amp.	**08**
	b	With neat circuit diagram explain op-amp based inverting summing amplifier and averaging amplifier with the relevant expressions for the output.	**06**
	c	In the circuit of inverting summing amplifier Va=1V, Vb=2V, Vc=3V Ra=Rb=Rc=3Kohm, R_F=1Kohm and supply voltage =15V. Assuming that op-amp is initially nulled find Vo.	**06**
		OR	
Q. 08	a	Draw the circuit and waveforms for an inverting Schmitt Trigger using op-amp with relevant expressions for Vut, Vlt and explain. In this circuit if R1=100ohm R2=3.9kOhmV Vin=500mV P-P sine wave and saturation voltage=14V find Vut , Vlt and Vhy.	**10**
	b	The 741C is configured as a non-inverting amplifier and following data are given for the circuit. A=400,000 Ri=33Mohm Ro=60ohm R1=470ohm Rf=4.7kohm Supply=15V, UGB=0.6MHz Compute the closed loop parameters Af,Rif,Rof, Ff.	**10**
		Module-5	
Q. 09	a	Explain working of second order LPF. Write the design equations. Design the circuit for cut-off frequency of 1KHz and draw frequency response of the circuit.	**12**
	b	Explain the operation of 2-bit DAC using R-2R circuit.	**08**
		OR	
Q. 10	a	What is meant by precision rectification ?Explain with a neat circuit diagram, the working of small signal halfwave precision rectifier using op-amp.	08
	b	With the help of a neat circuit diagram and waveforms explain the working of astable circuit operation using 555 timer IC. Derive the expression for Ton, Toff and T.	**12**

Table showing the Bloom's Taxonomy Level, Course Outcome and Program Outcome

Question		**Bloom's Taxonomy Level attached**	**Course Outcome**	**Program Outcome**
Q.1	(a)	L1	CO 01	
	(b)	L2	CO 01	
	(c)	L3	CO 01	

Q.2	(a)	L1	CO 01	
	(b)	L2	CO 01	
	(c)	L3	CO 01	
Q.3	(a)	L2	CO 02	
	(b)	L2	CO 02	
	(c)	L3	CO 02	
Q.4	(a)	L2	CO 02	
	(b)	L2	CO 02	
	(c)	L3	CO 02	
Q.5	(a)	L2	CO 03	
	(b)	L3	CO 03	
	(c)	L2	CO 03	
Q.6	(a)	L2	CO 03	
	(b)	L3	CO 03	
Q.7	(a)	L2	CO 04	
	(b)	L2	CO 04	
	(c)	L3	CO 04	
Q.8	(a)	L2	CO 04	
	(b)	L3	CO 04	
Q.9	(a)	L2	CO 05	
	(b)	L3	CO 05	
Q.10	(a)	L2	CO 05	
	(b)	L3	CO 05	

Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering(knowledge):L_1	Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills		
	Analyzing (Analysis):L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6