CBCS SCHEME

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

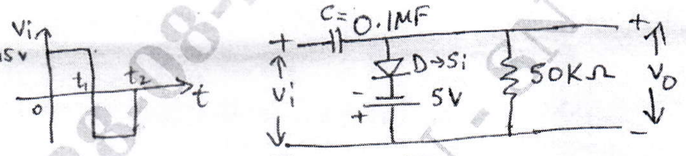
BEE303

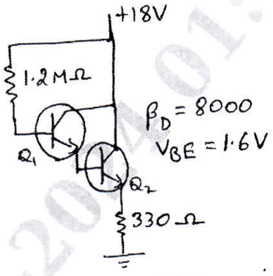
Third Semester B.E./B.Tech. Degree Examination, June/July 2024

Analog Electronic Circuits

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define bias stabilization. Derive an expression for $S(I_{CO})$ and $S(V_{BE})$ for fixed bias configuration.	8	L3	CO1
	b.	Analyze the circuit shown below in Fig. Q1 (b) and draw the output waveform. Assume $V_D = 0.7$ V.  Fig. Q1 (b)	7	L4	CO1
	c.	Explain the circuit of transistor switch being used as inverter.	5	L2	CO1
		OR			
Q.2	a.	Derive an expression for I_B, I_C and V_{CE} for voltage divider bias using exact / approximate analysis.	8	L3	CO1
	b.	Determine the operating point for the voltage divider bias circuit with $\beta = 80$ and $V_{BE} = 0.6$ V. Find the new operating point when β changes to 100 and V_{BE} changes to 0.25 : Given $V_{CC} = 15$ V, $R_1 = 100$ kΩ, $R_2 = 18$ kΩ, $R_C = 4.7$ kΩ, $R_E = 1$ kΩ.	8	L2	CO1
	c.	Explain the parallel clipper circuit for positive cycle with a neat waveform.	4	L2	CO1
		Module – 2			
Q.3	a.	Define h-parameters. Discuss the advantages of using hybrid model to represent the transistor.	10	L2	CO1
	b.	Derive the expressions for A_V, A_i, Z_i and Z_O for emitter follower circuit CC configuration using complete hybrid equivalent model.	10	L2	CO2
		OR			
Q.4	a.	Describe Miller effect and derive an equation for Miller input and output capacitances.	10	L3	CO2
	b.	Explain the lower and higher cut off frequency effect in multistage amplifier.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain RC coupled CE-CE cascaded amplifier.	7	L2	CO2
	b.	Explain the concept of feedback amplifier.	8	L2	CO2
	c.	A given amplifier arrangement has the following voltage gains, $A_{V_1} = 10$, $A_{V_2} = 20$ and $A_{V_3} = 40$. Calculate the overall voltage gain. Also express each gain in dB and determine the total voltage gain in dB.	5	L3	CO2

		OR			
Q.6	**a.**	Explain the classification of feedback amplifiers.	**8**	**L2**	**CO3**
	b.	Explain the operation of CASCODE connection with the help of neat diagram.	7	**L2**	**CO3**
	c.	For the circuit shown in Fig. Q6 (c), calculate the dc bias voltage and currents.  Fig. Q6 (c)	**5**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Explain the operation of class B push pull amplifier with relevant waveforms. Show that the maximum conversion efficiency of the class B push pull amplifier is 78.5%	**10**	**L2**	**CO3**
	b.	With the help of neat circuit diagram. Explain the operation of transistor RC phase shift oscillator. Derive the expression for the frequency of oscillation.	**10**	**L2**	**CO3**
		OR			
Q.8	**a.**	Derive the expression for the frequency of aWein bridge oscillator and explain its operation with a neat circuit diagram.	**10**	**L3**	**CO3**
	b.	In a Hartley oscillator $L_1 = 20\mu H$, $L_2 = 2mH$ and C is variable. Calculate the range of C if frequency is to be varied from 1 MHz to 2.5 MHz. Neglect mutual inductance.	**5**	**L3**	**CO3**
	c.	State the causes of distortion and define Total Harmonic Distortion (THD).	**5**	**L1**	**CO3**
		Module – 5			
Q.9	**a.**	Describe the construction and operation of n-channel JFET.	**8**	**L2**	**CO3**
	b.	Derive an expression for voltage divider Bias circuit with JFET.	**8**	**L3**	**CO3**
	c.	A JFET has $g_m = 6mV$ at $V_{GS} = -1$ V. Calculate I_{DSS} if pinch off voltage $V_P = -2.5V$.	**4**	**L2**	**CO3**
		OR			
Q.10	**a.**	Describe the construction and operation of N-channel enhance type MOSFET.	**8**	**L2**	**CO3**
	b.	Derive an expression for Fixed bias circuit for the N-channel JFET.	**8**	**L3**	**CO3**
	c.	Write a short note on biasing of MOSFET.	**4**	**L1**	**CO3**

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