Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN											Course Code	2	1	E	C	3	4

Third Semester B.E. Degree Examinations, April/May 2023

ANALOG ELECTRONIC CIRCUITS

Duration: 3 hrs **Max. Marks: 100**

Note: ***1. Answer any* FIVE *full questions, choosing* ONE *full question from each module.***
2. Missing data, if any, may be suitably assumed

Q. No		*Question*	*Marks*	*(RBTL:CO:PI)*
		MODULE – 1		
1.	**a.**	Sketch the equivalent circuit of a diode with characteristics.	**04**	(2 :1 : 1.3.1)
	b.	Explain the Centre-Tapped full wave rectifier and calculate the efficiency.	**08**	(2 :1 : 1.3.1)
	c.	Define clippers and explain the working of series clippers circuit along with the waveforms.	**08**	(2 :1 : 1.3.1)
		OR		
2.	**a.**	Explain the construction and operation of BJT and also write the symbols of pnp and npn transistor.	**06**	(2 :1 : 1.3.1)
	b.	Explain fixed voltage and adjustable voltage regulators.	**08**	(2 :1 : 1.3.1)
	c.	With neat diagram explain the transfer and drain characteristics of n-channel MOSFET.	**06**	(2 :1 : 1.3.1)
		MODULE – 2		
3.	**a.**	Considering the conceptual circuit of common emitter configuration, derive the expressions for g_m, r_π, r_e. Draw the hybrid π- model of a transistor.	**08**	(2 :2 : 1.3.1)
	b.	A BJT having β =150 is biased at a DC collector current 2 mA. Find the value of g_m, r_e, r_π, at bias point.	**04**	(2 :2 : 2.1.2)
	c.	Obtain the DC conditions for voltage divider bias circuit for a CE-BJT amplifier and give design constraints along with remark on stability of Q.	**08**	(2 :2 : 1.3.1)
		OR		
4.	**a.**	Explain biasing of MOSFET by fixing V_{GS}.	**06**	(2 :2 : 1.3.1)
	b.	Draw the small signal equivalent model of MOSFET, derive an expression for voltage gain and transconductance.	**08**	(2 :2 : 1.3.1)
	c.	What is transconductance and mention the three different expressions used to calculate transconductance.	**06**	(2 :2 : 1.3.1)
		MODULE – 3		
5.	**a.**	With a neat circuit diagram and ac equivalent circuit, derive the expression for R_{in}, R_0, A_v for a common source amplifier.	**08**	(2 :3 : 1.3.1)
	b.	Explain the low frequency response of CS amplifier using MOSFET and derive lower cut-off frequency	**08**	(2 :3 : 1.3.1)
	c.	Explain Junction capacitance in MOSFET.	**04**	(2 :3 : 1.3.1)
		OR		
6.	**a.**	Obtain the high frequency response of a CS amplifier.	**10**	(2 :3 : 1.3.1)
	b.	Write a short note on current Mirrors and current steering circuits.	**10**	(2 :3 : 1.3.1)

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

MODULE – 4

7.	**a.**	With neat block diagram explain the working of a current series feedback amplifier. Obtain expressions for gain, input resistance and output resistance with feedback	**10**	(2 :4 : 1.3.1)
	b.	Determine the voltage gain, input and output impedance with feedback for a voltage series feedback amplifier having A = -100, Ri =10 k Ω, R_0 = 20 kΩ for a feedback of (i) β = 1 and (ii) β= - 0.5.	**10**	(2 :4 : 2.1.2)

OR

8.	**a.**	Explain a class B output stage. Prove that the maximum conversion efficiency of a class B transformer coupled amplifier is 78.5%.	**08**	(2 :4 : 1.3.1)
	b.	Compare different types of power amplifiers.	**06**	(2 :4 : 1.3.1)
	c.	Explain in brief the working of a Class C power amplifier.	**06**	(2 :4 : 1.3.1)

MODULE – 5

9.	**a.**	Explain the working of instrumentation amplifier using transducer bridge and derive the expression for output voltage.	**10**	(2 :5 : 1.3.1)
	b.	Explain the working of a successive approximation type of ADC.	**10**	(2 :5 : 1.3.1)

OR

10.	**a.**	Draw the circuit and frequency response of a first order low pass filter.	**06**	(2 :5 : 1.3.1)
	b.	Draw the circuit and explain the frequency response of a second order band pass filter.	**06**	(2 :5 : 1.3.1)
	c.	Explain the operation of Mono-stable multi vibrator with relevant diagrams and waveforms.	**08**	(2 :5 : 1.3.1)

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