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RV College of Engineering

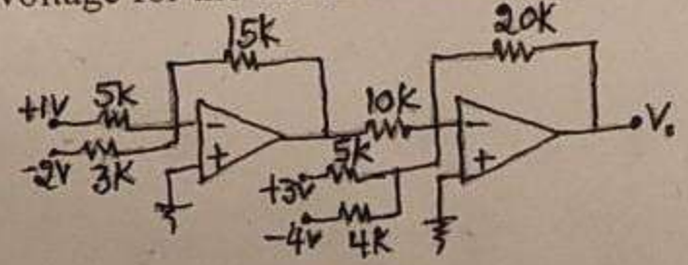
Department of Electronics & Communication Engineering

Date: 14th May 2024	**Test - 1**	**Max. Marks: 50**
Semester: II	**UG**	**Duration: 1 $\frac{1}{2}$ Hrs**
Course: PRINCIPLES OF ELECTRONICS ENGINEERING		**Code: EC123ATC**

S No		Questions	M	BT	CO
1.	a	Draw the circuit diagram of a Full wave Bridge rectifier circuit with filter and explain its operation along with suitable waveforms.	6	1	2
	b	A full wave bridge rectifier using ideal diodes is supplied from the secondary of a 10:1 transformer, whose primary is connected to 220V, 50Hz main supply. The output of the rectifier is connected to a load resistance of 220Ω in parallel with a capacitor filter C. Calculate the value of C required so that the ripple factor is 3%. Also determine: i) The dc output voltage ii) The load regulation	4	3	3
2.	a	Design the Zener Regulator for the given Specifications: Vin varies from 12V to 18V R_L varies from 100Ω to 1KΩ V_Z=6V I_Z(min)=6mA P_d(max)=1164mW	6	3	3
	b	Draw the block diagram of a DC power supply and explain the function of each block.	4	1	2
3.	a	An amplifier has a gain of 60dB, bandwidth of 30KHz, Distortion of 15%, input impedance of 5KΩ and an output impedance of 1KΩ. If voltage series negative feedback of 3.9% is given to the amplifier, Calculate the gain, input impedance, output impedance, amount of feedback, bandwidth and distortion of the amplifier with negative feedback.	6	2	3
	b	List any six advantages of negative feedback.	4	1	2
4.	a	Draw the circuit diagram of a single stage RC coupled amplifier. With the help of frequency response, discuss the effect of capacitors in each region.	6	3	1
	b	Explain the working of Photodiode and LED.	4	2	2
5.	a	List two conditions for Barkhausen criteria. Draw the circuit and explain the working of Wein Bridge Oscillator.	6	3	1
	b	Three amplifiers stages are working in cascade with 0.04V peak to peak input, providing 160V peak to peak output. If the voltage gain of the first stage is 15 and the input to the third stage is 10V peak to peak, Find i.Overall voltage gain ii.Voltage gain of the second and third stages iii.Input voltage to the second stage	4	3	1

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	16	18	16	-	14	10	26	-	-	-

Date: 19th May 2024	**Test - 2**	**Max. Marks: 50**
Semester: II	**UG**	**Duration: 1 $\frac{1}{2}$ Hrs**
Course: PRINCIPLES OF ELECTRONICS ENGINEERING		**Code: EC123ATC**

S No		Questions	M	BT	CO
1.	a	Draw the circuit of a non-inverting amplifier and derive the expression for the gain of non-inverting amplifier using an op-amp.	4	2	1
	b	Determine the output voltage for the circuit shown in fig 1b.  Fig 1b	6	3	2
2.	a	Draw the circuit of an integrator using an op-amp and derive the expression for the output voltage.	4	2	1
	b	Draw the circuit and calculate the values of different resistors of a summer circuit using two ideal op-amps to get $V_o = 2V_1-4V_2+6V_3$, Where $+V_1$, $+V_2$, $+V_3$ are the three available inputs.	6	3	3
3.	a	Write the logic Circuit for EX-OR gate and realize it using minimum number of NOR gates.	4	2	2
	b	Draw the truth table for "SUM" and "CARRY OUT" of a full adder. From the truth table, obtain logic expressions and realize the full adder using two half adders.	6	3	2
4.	a	State and prove Demorgan's theorem.	4	1	2
	b	$Y(a,b,c,d)=\Sigma(4,6,12,13,14,5,7,10)$. Simplify the above using K-map and realize Y using basic gates	6	4	3
5.	a	Simplify the following expressions and realise using basic gates. $Y = A'BC+A'BC'+ABC'+AB'C'$	4	4	2
	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	2

Marks	Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Max					4	12	24	10	-	-

b.	Draw the block diagram of digital Communication system and explain the function of each block.	6	2	3
5a.	A carrier wave with amplitude 10V and frequency 10MHz is amplitude modulated by an audio signal of frequency 1KHz. Write the equation for this AM wave.	4	3	2
b	With the help of a block diagram representation describe Super heterodyne receiver.	6	2	3

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	13	25	18	4	10	20	18	12	-	-

Date: 02nd July 2024	**Improvement CIE**	**Max. Marks: 60**
Semester: II	**UG**	**Duration: 2 Hrs**
Course: PRINCIPLES OF ELECTRONICS ENGINEERING		**Code: EC123ATC**

Sl. No	PART-A	M	BT	CO
1	An audio signal of 2KHz is used to amplitude modulate a carrier of 800KHz.The bandwidth required is _____KHz.	1	2	1
2	The total power delivered by an amplitude modulated wave is 2640Watts.If the modulation index =0.8, the power in each side band=_____.	1	3	1
3	The total modulation index, if m1=0.8 and m2=0.4 is _____.	1	3	2
4	A 100W carrier is modulated to a depth of 75%.The total power in the AM modulated wave is _____.	1	2	2
5	The value of intermediate frequency in super heterodyne receiver is_____.	1	1	1
6	Convert the given number $(6FE4)_{16}$ to binary.	1	3	1
7	For a Superheterodyne AM receiver, if the RF input is at 1400KHz, the local oscillator frequency=_____KHz.	1	2	3
8	The decimal equivalent of the hexadecimal number $(2F3)_H$ will be _____.	1	3	3
9	The 1's complement of (1010) in binary form will be _____.	1	2	1
10	The number of sidebands in AM Frequency Spectrum is _____.	1	1	2

Sl. No	PART-A	M	BT	CO
1a.	What is modulation and explain the need for modulation.	4	1	1
b.	Perform the Following: a) Convert the number $(5062)_{10}$ to the binary system. b) Convert $(380)_{10}$ to the hexadecimal number system. c) Convert the binary number $(11001011)_2$ to the decimal number system.	6	3	2
2a.	Draw the block diagram of general Communication system and explain each block in detail.	4	2	3
b.	The output of an AM transmitter is given by $V_{AM}(t)=50(1+0.6\cos 12560t)\sin 628*10^4t$. Determine: i) The sideband frequencies ii) Modulation index and bandwidth iii) The total power in the AM wave given the carrier power is 2KW.	6	4	2
3a.	List any Eight differences between AM and FM	4	1	1
b.	The current drawn by the antenna of an AM transmitter is 8A when only carrier is present and this increases to 8.93A when the carrier is modulated by a sine wave. Find the percentage modulation. Determine the antenna current when the depth of modulation changes to 0.8.	6	4	2
4a.	Given AM wave $S(t) = 20[1+0.6\sin 3140t]\sin 31.4*10^6t$. Draw the frequency spectrum for the given AM wave	4	3	4

USN

RV COLLEGE OF ENGINEERING®

(An Autonomous Institution Affiliated to VTU)

I / II Semester B. E. Regular / Supplementary Examinations Aug-2024

PRINCIPLES OF ELECTRONICS ENGINEERING

Time: 03 Hours *Maximum Marks: 10*

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8, 9 and 10.

PART-A

			M	BT	CO
1	1.1	Design an inverting amplifier using op-amp with closed loop voltage gain of −15.	02	3	2
	1.2	An op-amp has an open loop voltage gain of 10^4 and common mode voltage gain of 0.1. Express *CMRR* in dB.	02	2	1
	1.3	Use 2's compliment to perform subtraction of $M - N$ where '*M*' is 1010100 and '*N*' is 1000100.	02	1	1
	1.4	Realize *AND* and *OR* gate using *NAND* gates.	02	1	1
	1.5	State the necessary and sufficient conditions to obtain sustained oscillations.	02	2	1
	1.6	Compare and contrast active and passive electrical transducers.	02	2	2
	1.7	Linear variable differential transformer works on the principle of _____.	01	1	1
	1.8	Mention any two advantages of Modulation.	02	1	1
	1.9	*BJT* is a _____ controlled device.	01	1	1
	1.10	In regulated *DC* power supply the output voltage drops from 12 *V* to 11.8 *V* when the input voltage reduces by 10%. The line regulation is _____.	02	2	2
	1.11	The values of β that correspond to α value of 0.985 and 0.992 respectively are _____ and _____.	02	2	1

PART-B

2	a	Compare and contrast Zener breakdown with Avalanche breakdown.	04	2	2
	b	Design a zener regulator for the following specifications: i) Output voltage, $V_0 = 5V$, ii) Input voltage , $V_i = 12 \pm 3V$ iii) Load current, $I_L = 20\,mA$ iv) Zener wattage $P_Z = 500\,mW$	06	3	3
	c	Draw the input and output characteristics of a *BJT* in *CE* configuration and briefly explain three regions of operation.	06	2	1
3	a	With the help of relevant diagrams, explain the principle of working of wein bridge oscillator.	06	2	1
	b	Enlist any six advantages of negative feedback.	06	1	1
	c	In an *RC* phase shift oscillator, estimate the values of *R* and *C* for an output frequency of 1 *kHz*.	04	2	2

OR

4	a	Enlist any four typical characteristics of an ideal op-amp.	04	1	1
	b	With the help of circuit diagram, explain Non inverting amplifier.	06	2	1
	c	Design an adder circuit using op-amp to obtain an output voltage given by $V_0 = -[0.5V_1 + 0.8V_2 + 2V_3]$ where V_1, V_2, and V_3 are the inputs.	06	3	3
5	a	Simplify i) $ABC + A\overline{B}C + AB\overline{C}$ ii) $XY + XYZ + XY\overline{Z} + \overline{X}YZ$ iii) $\overline{a}b(\overline{a} + b)(\overline{b} + b)$ iv) $(a + c)(ad + \overline{a}d) + ac + c$	08	2	1
	b	Realize i) $Y = \overline{A}\ \overline{B}\ \overline{C}\ D + \overline{A}\ B\ \overline{C}\ D + \overline{A}\ B\ C\ D + \overline{A}\ B\ C\ \overline{D} + A\ B\ \overline{C}\ \overline{D} + A\ B\ \overline{C}\ D + A\ B\ C\ D + A\ \overline{B}\ C\ D$ ii) $f(A,B,C,D) = \sum m\,(0,1,4,8,9,10)$ using four variable k-map and also realize the simplified term using basic gates.	08	2	2
		OR			
6	a	Write the truth table for *SUM* and *CARRY OUT* of a full adder. From the truth table, obtain the logic expressions for the same and then realize the full adder using two half adders.	08	2	2
	b	Simplify the following expressions and realize them using *NAND* gates: i) $AB + A(B + C) + B(B + C)$ ii) $a\overline{b} + abc + a(b + a\overline{b})$	08	3	2
7	a	With the help of block diagram, explain the communication system.	08	1	3
	b	An audio signal of 1 kHz is used to amplitude modulate a carrier of 600 kHz, determine: i) side band frequencies ii) band width required.	04 04	2 1	2 1
	c	Enlist any four differences between *RISC* and *CISC*.			
		OR			
8	a	With the help of neat block diagram explain the working of a super heterodyne receiver.	08	2	1
	b	The output voltage of a transmitter is given by $400\,(1 + 0.4\cos 6280t)\cos 3.14 \times 10^{-7}t$. This voltage is fed to the load of 600 Ω resistance. Determine: i) carrier frequency ii) Modulating frequency.	04	3	2
	c	The antenna current of an *AM* transmitter is 12 *Amp* when only carrier is sent. It increases to 15 Amp when the carrier is modulated by 1 kHz sine wave. Find the modulation index. Determine the antenna current when the depth of modulation changes to 0.7.	04	3	3
9	a	With the help of relevant diagrams, elaborate on the working of linear variable differential transformer.	08	1	1
	b	Enlist any four applications of hall effect transducer.	04	1	1

	c	A hall effect transducer is used for the measurement of magnetic field of $0.5\,wb/m^2$. The $2\,mm$ thick slab is made of Bismuth for which the Hall's co-efficient is $-1 \times 10^{-6}\,Vm/A - wbm^{-2}$ and the current is $3\,A$. $E_H = \frac{K_H B I}{t}$	04	2	3
		OR			
10	a	Mention the basic difference between a sensor and transducer. Elaborate on the working of: i) *LDR* and ii) Humidity sensor with the help of relevant sketches/circuit diagram.	08	1	1
	b	With the help of relevant schematic brief upon the working principle of i) Capacitive transducer ii) Piezoelectric transducer	08	1	1