Q. Code:736937

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Fourth Semester

EC22401 – ANALOG INTEGRATED CIRCUITS AND ITS APPLICATIONS

(Electronics and Communication Engineering)

(Regulation 2022)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Infer the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques.	**2**
CO 2	Elucidate and analyze the linear and non-linear applications of an opamp.	**4**
CO 3	Classify and comprehend the working principle of data converters.	**4**
CO 4	Illustrate the function of application specific ICs such as Analog multiplier, PLL and its application in communication.	**2**
CO 5	Explain the working of multivibrators using IC 555, the special function ICs such as Voltage regulators, buck-boost converters, A/V amplifiers etc.	**3**

PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	List the assumptions to be made for op-amp analysis.	**1**	**2**
2.	Define CMRR. Justify why CMRR should be high for op-amp.	**1**	**3**
3.	Draw the circuit diagram of the Voltage follower and output waveform if the input is a sinusoidal signal.	**1**	**2**
4.	Explain the virtual ground concept in op-amp.	**1**	**2**
5.	Mention two linear and two non-linear applications of an op-amp.	**2**	**2**
6.	Illustrate how a differential amplifier using op-amp can be converted into a subtractor circuit.	**2**	**3**
7.	Point out the need for converting a first order filter into a higher order filter.	**2**	**3**
8.	Sketch the circuit diagram of antilog amplifier using an op-amp.	**2**	**2**

9.	Show the block diagram of sample and hold circuit.	**3**	**2**
10.	List out the specifications of DAC.	**3**	**2**
11.	State the advantages of R-2R ladder DAC over binary weighted type DAC.	**3**	**2**
12.	Obtain the number of comparators required for realizing a 4-bit flash ADC.	**3**	**3**
13.	Summarize the basic analog multiplication techniques.	**4**	**2**
14.	Give the limitations of emitter coupled transistor pair analog multiplier.	**4**	**2**
15.	State the various applications of PLL.	**4**	**2**
16.	Interpret the relation between capture range and lock range in a PLL.	**4**	**3**
17.	Justify the need for voltage regulator ICs.	**5**	**3**
18.	Draw the functional block diagram of IC 723 regulator.	**5**	**2**
19.	List the characteristics and applications of Optocoupler.	**5**	**2**
20.	Analyze the purpose of one shot multivibrator.	**5**	**2**

PART- B (5 x 10 = 50 Marks)

			Marks	CO	RBT LEVEL
21. (a)	Construct the BJT differential amplifier and explain its operation. Derive the expression for CMRR.		**(10)**	**1**	**3**
	(OR)				
(b)	List and explain the DC characteristics of an operational amplifier.		**(10)**	**1**	**3**
22. (a)	With a suitable circuit diagram, explain the operating principle of an instrumentation amplifier and derive its gain.		**(10)**	**2**	**4**
	(OR)				
(b)	**(i)**	Analyse the first order Low pass filter and derive its voltage gain.	**(6)**	**2**	**4**
	(ii)	Design a first order low pass Butterworth filter using operational	**(4)**	**2**	**4**

amplifier for the upper cut off frequency of 2.5kHz. Assume the value of capacitor to be 0.1μF.

23. (a)	Analyze the working of R-2R ladder type DAC.	**(10)**	**3**	**3**
	(OR)			
(b)	**(i)** Describe about the Successive approximation type ADC with neat sketch.	**(6)**	**3**	**3**
	(ii) Show the conversion sequence using Successive approximation type ADC for an input of 110110110110 .	**(4)**	**3**	**3**
24. (a)	Analyze the Gilbert's multiplier cell with a neat circuit diagram.	**(10)**	**4**	**3**
	(OR)			
(b)	Illustrate the operation of VCO with block diagram. Derive the expression for f_0 and voltage to frequency conversion factor.	**(10)**	**4**	**3**
25. (a)	Explain the working of Astable Multivibrator. List applications in detail.	**(10)**	**5**	**3**
	(OR)			
(b)	**(i)** Discuss in detail the working principle of switching regulator.	**(6)**	**5**	**3**
	(ii) Examine the operation of frequency to voltage converters.	**(4)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Design a practical integrator circuit with a D.C. gain of 10 to integrate a square wave of 10 kHz.	**(10)**	**2**	**5**

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