Question Paper Code: U4B04

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024
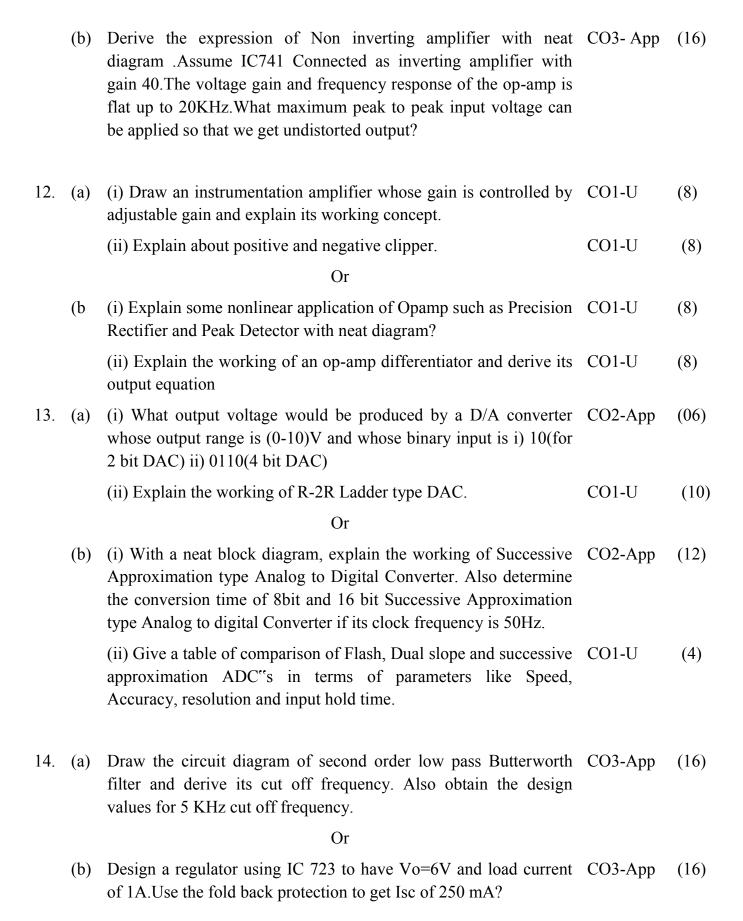
Fourth Semester

Biomedical Engineering

21UBM404 - ANALOG INTEGRATED CIRCUITS

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Define Virtual ground of an OPAMP	CO1-U
2.	What are the five ideal conditions of an operational amplifier?	CO1-U
3.	Give one application of voltage follower, Schmitt Trigger, Clamper and Peak Detector	CO1-U
4.	Write down the condition for good differentiation.	CO1-U
5.	Compare and contrast binary ladder and R-2R ladder DAC?	CO1-U
6.	Write down the drawback of weighted Resistor type D/A converter.	CO1-U
7.	Identify the purpose of having input and output capacitors in three terminal IC regulators?	CO1-U
8.	Draw the functional diagram of 723 regulators?	CO1-U
9.	Define the duty cycle in Astable multivibrator using IC 555.	CO1-U
10.	List out the three stages through which PLL operates?	CO1-U

PART – B (5 x 16= 80 Marks)

11. (a) (i) Draw the OPAMP differential amplifier circuit and derive the   CO3-App   (16)
expression for output voltage. (10 Mark)

(ii) A differential Amplifier has i) CMRR=1000 and ii) CMRR = 10,000.The first set of inputs is V1=100µV and V2=-100µV.The second set of input is V1=1100µV and V2= 900µV.Calculate the percentage difference in output voltage obtained for the two sets of input voltages and also comment on this (6 Mark)

Or

(b) Derive the expression of Non inverting amplifier with neat diagram .Assume IC741 Connected as inverting amplifier with gain 40.The voltage gain and frequency response of the op-amp is flat up to 20KHz.What maximum peak to peak input voltage can be applied so that we get undistorted output? CO3- App (16)

12. (a) (i) Draw an instrumentation amplifier whose gain is controlled by adjustable gain and explain its working concept. CO1-U (8)

(ii) Explain about positive and negative clipper. CO1-U (8)

Or

(b (i) Explain some nonlinear application of Opamp such as Precision Rectifier and Peak Detector with neat diagram? CO1-U (8)

(ii) Explain the working of an op-amp differentiator and derive its output equation CO1-U (8)

13. (a) (i) What output voltage would be produced by a D/A converter whose output range is (0-10)V and whose binary input is i) 10(for 2 bit DAC) ii) 0110(4 bit DAC) CO2-App (06)

(ii) Explain the working of R-2R Ladder type DAC. CO1-U (10)

Or

(b) (i) With a neat block diagram, explain the working of Successive Approximation type Analog to Digital Converter. Also determine the conversion time of 8bit and 16 bit Successive Approximation type Analog to digital Converter if its clock frequency is 50Hz. CO2-App (12)

(ii) Give a table of comparison of Flash, Dual slope and successive approximation ADC"s in terms of parameters like Speed, Accuracy, resolution and input hold time. CO1-U (4)

14. (a) Draw the circuit diagram of second order low pass Butterworth filter and derive its cut off frequency. Also obtain the design values for 5 KHz cut off frequency. CO3-App (16)

Or

(b) Design a regulator using IC 723 to have Vo=6V and load current of 1A.Use the fold back protection to get Isc of 250 mA? CO3-App (16)

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15. (a) Draw the basic schematic of the PLL and explain its operation. CO1-U (16)
Derive the expression for the capture range and lock range of
Phase Locked Loop.

Or

(b) With suitable block diagram, explain the operation of 566 voltage CO1-U (16)
controlled oscillator. Also derive an expression for the frequency
of the output waveform generated.

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