DATE: 17-04-2017

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**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

B.Sc ELECTRONICS-II SEMESTER

SEMESTER EXAMINATION-MARCH 2017

**EL - 212 Operational Amplifiers and Applications**

**Time: 3 Hrs Maximum marks: 100**

This question paper has **TWO** printed pages and **THREE** parts

PART-A

Answer any **FIVE** questions. 5×12=60

1 a) Give the classification of the differential amplifier and write the diagram for one of

 them.

 b) Explain the current mirror circuit.

 c) Derive the equation for voltage gain of the differential amplifier. (3+3+6)

2 a) Give the block diagram of Op-Amp. And explain each block.

 b) Derive the equation for Output impedance with feedback for INV amplifier.

 c) Derive the expression for closed loop gain for a INV amplifier using Virtual ground

 concept. (4+4+4)

3 a) Derive the expression for output voltage of a Differential amplifier using Op-Amp.

 b) With necessary circuit and waveforms explain NON-INV comparator for a

 reference voltage of+2V. (6+6)

4 a) With required circuit and waveforms explain Schmitt trigger using Op-Amp.

 b) Explain the classification of Active filters.

 c) Define and explain frequency scaling. (6+3+3)

5 a) Explain the requirements for a circuit to work as an Oscillator.

 b) Explain the working of Wein Bridge Oscillator and derive the equation for

 frequency of Oscillation. (4+8)

6 a) Define Multivibrator and explain a transistor based Bistable multivibrator.

 b) Explain the functional block diagram of IC 555. (6+6)

7 a) Explain a Monolithic Power amplifier.

 b) What is the need for voltage regulators? Explain with block diagram. (6+6)

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PART-B

Answer any **FIVE** questions. 5×6=30

8. For a dual input balanced output differential amplifier RC=2.2 KΩ, RE=4.7 KΩ

 ±VCC=10 V, VBE =0.715 V, Rin= 50 Ω and βac=βdc=100. Calculate the operating

 point, voltage gain and input impedance.

9. The 741C Op-Amp having the following parameters, is connected as a NON-INV

 amplifier with R1=1 KΩ, RF =10 KΩ, A= 200,000, Ri =2 MΩ, Ro= 75 Ω and

 fo=5 Hz. Compute AF,RiF ,RoF and fF.

10. Design a summing amplifier in the differential configuration which making use of

 voltage sources V1,V2,V3and V4 that will produce an output = V1+V2-V3-V4 .

11. Design a Band pass filter for a pass band gain of 6 with higher cut off frequency of

 10 KHz and a center frequency of 5 KHz, assume the capacitors 0.033 µF and

 0.33 µF. Draw the diagram.

12. The frequency of a Hartley Oscillator is 25 KHz. If the capacitance of the capacitor

 used is 450 pF, calculate the inductance .If the two series of the split inductance

 are in the ratio of 2:1, calculate each inductance.

13. In a ASTABLE multivibrator using Timer IC produces a rectangular wave whose

 frequeny is 125 Hz, the circuit is making use of C=0.01 µF and duty cycle is

 0 .66. Determine the value required for RA, RB, tON , and tOFF .

14. The ac equivalent circuit of a crystal has these values L=1 H, C= 0.01 µF, R=1 K Ω

 and Cm =200 pF . Calculate fs and fp of the crystal.

PART-C

Answer any **FIVE** questions. 5×2=10

15 a) What is level translator circuit? Explain?

 b) Write the diagram for offset null adjustment using IC 741.

 c) For a closed loop voltage gain AF=1 and R1=RF . What is the bandwidth with

 feedback for INV and NON-INV amplifier.

 d) What is an order of a filter? What is its importance?

 e) Write the transistor Astable Multivibrator circuit and mark the charging path for

 both the capacitors.

 f) Name pin no. 4 of Timer IC and mention its significance.

 g) What is the minimum and maximum voltage can be regulated using LM 317.

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