

Register Number:

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**ST JOSEPH’S UNIVERSITY, BENGALURU -27**

**B.Sc. ELECTRONICS – 2nd SEMESTER**

**SEMESTER EXAMINATION: APRIL 2024**

**(Examination conducted in May / June 2024)**

**EL 221- Amplifiers, Oscillators & Op-Amp**

**(For current batch students only)**

**Time: 2 Hours Max Marks: 60**

**This paper contains 2 printed pages and 3 parts**

**PART-A**

Answer **ALL** questions **10×1=10** 1. These amplifiers can be used over a wide range of frequencies

a) DC amplifiers b) RC coupled amplifiers

c) LC coupled amplifiers d) transformer coupled amplifiers

2. The Darlington pair is mainly used for

a) Impedance matching b) wideband voltage amplification

c) power amplification d) reducing distortion

3. For amplifiers using negative feedback

a) Lowers its input and output resistances

b) increases its input and output resistances

c) increases its input impedance and lowers its output impedance

d) decreases the bandwidth

4. The gain of cascaded amplifier is equal to the

a) product of individual gains b) sum of individual gains

c) ratio of stage gains d) average of gains

5. The typical value of CMRR for differential amplifier is

a) 100 dB b) 90 dB c) 27 dB d) 0 dB

6. The op-amp comparator circuit uses

a) positive feedback b) negative feedback

c) regenerative feedback d) no feedback

7. Higher order active filters are used for

a) bandwidth b) gain in the pass band

c) impedance d) higher roll off rate

8. The feedback path in a practical op amp integrator consists of

a) a resistor b) a capacitor

c) a resistor and a capacitor in series d) a resistor and capacitor in parallel

9. A relaxation oscillator is one which

a) has two stable states b) relaxes indefinitely

c) produces sinusoidal output d) has no stable state

10. The maximum output voltage possible with LM 317 voltage regulator

a) 31 v b) 17 v c) 37 v d) 12 v

**PART-B**

Answer **FIVE** questions **5 × 6 = 30**

11 a) Draw the circuit diagram of a Darlington amplifier and derive the expression for its

 voltage gain and input impedance.

 b) Draw a push pull amplifier circuit. Explain crossover distortion. (3+3)

12 a) With the help of a circuit, explain the working of a double tuned amplifier.

 b) Explain the characteristics and working of CMOS inverter. (3+3)

13 a) Compare positive and negative feedback in amplifiers.

 b) Draw the circuit diagram of LC tuned oscillator and explain its working. (3+3)

14 a) Draw the crystal oscillator circuit and explain its working.

 b) Explain the working of an Astable Multivibrator circuit using transistors. (3+3)

15 a) Explain the current mirror circuit and derive the equation to verify it.

 b) Explain the op-amp block diagram. (3+3)

16 a) Draw the Inverting amplifier and derive the equation for RoF.

 b) Give the classification of first order active filters with relevant waveforms. (3+3)

17 a) With a neat diagram of Integrator circuit derive the equation for its output.

 b) Draw an op amp as a Schmitt trigger circuit and explain it working. (3+3)

**PART-C**

 Answer any **FIVE** questions **5 × 4 = 20**

18. The maximum Collector dissipation of a transistor used in a class A amplifier is 10W.

 When a signal is applied, the collector efficiency of the circuit is 32%. Calculate the ac

 Output power.

19. A single ended class A amplifier has a transformer coupled load of 8 Ω. If the

 transformer turns ratio (N1/N2) is 10, find the maximum power output delivered to the

 load. Consider the zero-signal collector current to be 500 mA.

20. In an Astable multivibrator using IC 555 RA=27kΩ, RB= 56 kΩ and C=0.01 µF, calculate

 the frequency and duty cycle of the output.

21. An amplifier with negative feedback gives an output of 12.5 V with an input of 1.5 V.

 When feedback is removed, it requires 0.25 V input for the same output. Find (a) value

 of voltage gain without feedback and (b) value of β, if the input and output are in phase

 and β is real.

22. In a transistor Colpitts Oscillator C1= 0.001 µF, C2= 0.01 µF and L= 5 µH. Find the

 required gain for oscillation and the frequency of Oscillation.

23. The 741C Op-amp connected as Non-Inv amplifier with R1=4kΩ, RF=10kΩ, A=200,000,

 Ri =2 MΩ, Ro=75Ω and fo=75Hz. Compute the value of AF, RiF, RoF and fF.

24. Determine the output voltage in the circuit given below

 

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