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END SEMESTER EXAMINATION, NOVEMBER-2018

Semester – 5th (Regular)

Subject Code : CAI-506

ELECTRONIC CIRCUITS AND DEVICES - II

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

1. All questions of PART-A are compulsory.
2. Answer any *five* questions from PART-B

PART – A

Marks – 25

1. Fill in the blanks :

1×10=10

- (a) Precision rectifier is a circuit with _____.
- (b) Frequency of operation of active filters is _____.
- (c) Band pass filter has one pass band and _____ stop band.

[Turn over

- (d) Band pass filter is called as _____ feedback filter.
 - (e) For AC analysis of the circuit $+V_{cc}$ and $-V_{cc}$ are set to _____.
 - (f) Frequency range of DC amplifiers _____.
 - (g) Tuned amplifiers are used to design _____.
 - (h) Q factor is _____.
 - (i) Power supply tries to provide _____ in the circuit.
 - (j) Regulation in shunt regulator is _____.
2. Write true or false : $1 \times 10 = 10$
- (a) If out of phase input voltage are applied to each of differential amplifier input signal is referred as common mode signal.
 - (b) Output resistance of differential amplifier is $2 R_c$.
 - (c) CMRR is differential gain to common mode gain.

- (d) Tank circuit uses inductor and capacitor.
 - (e) Single tuned amplifier uses one parallel tuned circuit.
 - (f) Tuned amplifier with poor output is called as potential instability.
 - (g) Common mode gain is very low.
 - (h) Adjustable voltage regulator improved line and load regulation.
 - (i) Double tuned amplifier is used to decrease the bandwidth.
 - (j) An ideal Op-Amp has large bandwidth.
3. Choose the correct answer : $1 \times 5 = 5$
- (a) The negative feedback in an amplifier
 - (i) Reduces the voltage gain
 - (ii) Increases the voltage gain
 - (iii) Does not affect the voltage gain
 - (iv) None of the above

(b) Application of SCR

- (i) Converter
- (ii) Inverter
- (iii) Chopper
- (iv) All of the above

(c) Common mode signals have

- (i) The same amplitude
- (ii) The same phase
- (iii) The same frequency
- (iv) All of the above

(d) At high frequencies oscillator used is

- (i) Crystal oscillator
- (ii) LC oscillator
- (iii) RC oscillator
- (iv) None of the above

(e) Limitation of active filter

- (i) Provide voltage gain
- (ii) Reduction in size
- (iii) Finite bandwidth
- (iv) None of the above

65/CAI-506/EC&D-II (R) (4)

110(B)

PART - B

Marks - 45

4. (a) Explain half-wave inverting precision rectifier with necessary waveforms. 3

(b) Give differences between active filters and passive filters. 3

(c) Design a low pass filter at cut off frequency of 16 KHz with passband gain 1.5. 3

5. (a) Draw the circuit diagram of differential amplifier using transistor. 3

(b) An emitter biased dual input balanced output differential amplifier has $V_{cc} = -V_{ee} = 15\text{ V}$, $R_{c1} = R_{c2} = 3\text{ K}\Omega$ and $R_{e} = 3.9\text{ K}\Omega$. Calculate operating current and voltage for transistor and voltage gain. 6

6. Derive the equation of output voltage using AC analysis of dual input and unbalanced output differential amplifier. 9

7. Draw and explain circuit diagram of inductive coupling single tuned amplifier with its frequency response. 9

65/CAI-506/EC&D-II (R) (5)

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8. (a) Explain the operation of Wien bridge oscillator and derive the frequency and condition for oscillation. 7
- (b) Calculate the value of $C_1=C_2$ for the Wien bridge oscillator to operate at a frequency of 15 KHz with $R_1=R_2=30\text{ K}\Omega$. 2
9. (a) Draw the block diagram of feedback amplifier in the following configuration :
(i) Voltage series feedback
(ii) Current shunt feedback 4
- (b) Give the advantages of negative feedback amplifier. How does negative feedback help in increasing stability ? 5
10. What is adjustable voltage regulator ? Derive the expression for the output voltage for LM317 adjustable voltage regulator. 2+7=9
11. Write short notes on following : 5+4=9
(i) SCR
(ii) Phase shift oscillator.