

**ANALOG ELECTRONIC CIRCUITS
(ECEN 2101)**

Time Allotted: 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

**Group – A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) A half wave rectifier falls in the category of
 - (a) Clamper
 - (b) Clipper
 - (c) None of the above
 - (d) Both of the above.
 - (ii) Biasing is necessary for
 - (a) Amplifiers
 - (b) Switches
 - (c) Both of the above
 - (d) None of the above.
 - (iii) The thermal runaway is common in
 - (a) Fixed bias
 - (b) Self bias
 - (c) Both of the above
 - (d) Collector feedback bias.
 - (iv) If gain of an amplifier increases the bandwidth
 - (a) Decreases
 - (b) Increases
 - (c) Remains unaltered
 - (d) All of the above.
 - (v) In designing oscillators
 - (a) Only negative feedback is required
 - (b) Only positive feedback is required
 - (c) Both type of feedbacks are required
 - (d) No feedback is required.
 - (vi) If the gain of an amplifier is G, the gain of the differential amplifier is
 - (a) G/2
 - (b) 2 G
 - (c) 3 G
 - (d) G/3

- (vii) Slew rate of an ideal OPAMP is
(a) Zero (b) One
(c) Infinite (d) Half of its bandwidth.
- (viii) The push-pull operation is required in
(a) Class A (b) Class B
(c) Both of the above (d) None of the above.
- (ix) Precision rectifier is used to rectify signals having voltage level
(a) Greater than 0.6 V (b) less than 0.6 V
(c) Greater than 5V (d) Greater than 0.2V.
- (x) A mono-stable circuit is designed using 555 timer. If $R = 10 \text{ M}\Omega$ and $C = 1.1 \mu\text{F}$ the quasi-stable state will be of
(a) 2 see (b) 10 See (C) 11 see (d) 1.1 see

Group – B

2. (a) What is an analog signal? With appropriate diagram explain the load line and Q point.
(b) How a load line varies with load resistance and supply voltage?
 $2 + (2 + 2) + (3 + 3) = 12$
3. (a) With appropriate circuit diagrams explain operation of a biased clipper.
(b) With suitable circuit diagrams explain clamping operation.

$$6 + 6 = 12$$

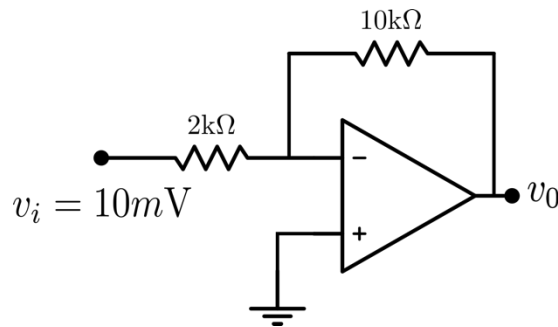
Group – C

4. (a) Draw and explain general block diagram of feedback amplifier. Referring to your diagram show that the closed loop gain becomes approximately inversely proportional to the feedback gain if the open loop gain is very high.
(b) With a suitable diagram show that the input impedance of a voltage series amplifier increases with negative feedback.
 $(3 + 3) + 6 = 12$
5. (a) Draw the circuit diagram of phase-shift oscillator. Derive its frequency of oscillation.
(b) With proper circuit diagram derive the frequency of operation of Wein Bridge oscillator.

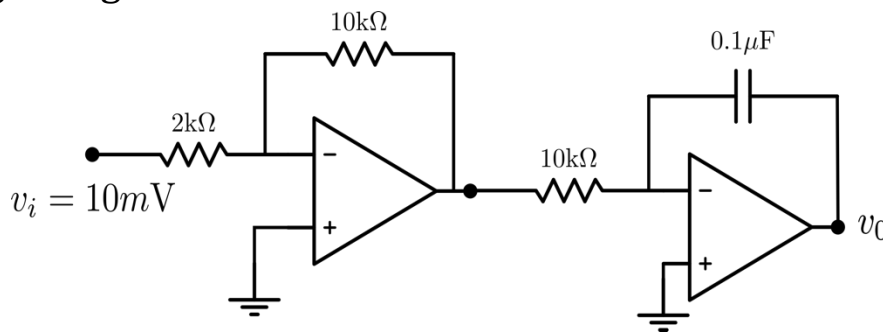
$$6 + 6 = 12$$

Group - D

6. (a) Write at least six characteristics of an ideal OPAMP. Showing every steps find the output voltage of the following circuit.



- (b) Find the output voltage of the following circuit after 10 mSec from the beginning.



$$(3 + 3) + 6 = 12$$

7. (a) Derive an expression for the efficiency of class A amplifier. Hence, find the maximum efficiency.
- (b) Derive an expression for the efficiency of class B amplifier. Hence, find the maximum efficiency.

$$6 + 6 = 12$$

Group - E

8. (a) Draw the circuit diagram of an instrumentation amplifier. Derive expression for the gain.
- (b) With proper circuit diagram explain the operational principle of a full wave precision rectifier.

$$6 + 6 = 12$$

9. (a) With the internal circuit diagram explain the operation of astable operation using 555 timer IC.
- (b) With the internal circuit diagram explain the operation of mono stable operation using 555 timer IC.

$$6 + 6 = 12$$

Department & Section	Submission Link (for Backlog)
ECE	https://classroom.google.com/c/MTg4ODEyNDk5N1pa?cjc=aomkvp7