

INDIAN MARITIME UNIVERSITY
(A Central University, Govt. of India)
End Semester Examinations- Dec 2019/Jan 2020
B.Tech (Marine Engineering)
Semester-III
UG11T3302– Analog Electronics and Communication

Date: 12.12.2019

Maximum Marks: 70

Time: 3 Hrs.

Pass Marks: 35

Part – A (compulsory)

Answer the following (10x2=20 Marks)

1. If A is the amplifier gain and β is the feedback gain then, which of the following represent Barkhausen's Criteria.
a. $A\beta = 1$ and $\angle A\beta = 2\pi n$ b. $A\beta > 1$ and $\angle A\beta = 2\pi n$
c. $A\beta = 1$ and $\angle A\beta = \pi n$ d. $A\beta > 1$ and $\angle A\beta = \pi n$
Where, $n = 0, 1, 2, 3, \dots$
2. Which of the following devices may be used in the firing circuit of SCRs.
a. Transistor b. UJT c. FET d. IGBT
3. Which class of amplifiers exhibit cross-over distortion in worst form—
a. Class A b. Class B c. Class AB d. None of these
4. Which of the oscillators has maximum stability?
a. RC phase-shift Oscillator b. Wein-bridge Oscillator
c. Crystal Oscillator d. LC tank circuit
5. Which of the following circuits is called a comparator with hysteresis?
a. Oscillator b. Amplifier c. Sweep Generator d. Schmitt Trigger
6. If the value of V_{th} (Threshold voltage, pin 6) is greater than $(2/3)V_{cc}$ and value of V_{tr} (Trigger voltage, pin 2) is greater than $(1/3)V_{cc}$, what will be the inputs to internal S-R FF of a 555 Timer IC.
a. $R=0, S=0$ b. $R=0, S=1$ c. $R=1, S=0$ d. $R=1, S=1$
7. Which of the features given in options below does not apply to an ideal OP-AMP.
a. Infinite Gain b. Zero Input Impedance c. Infinite Bandwidth
d. Infinite CMRR
8. A signal source V_i is connected to non-inverting input of an OPAMP via a $10K\Omega$ resistor. The inverting input is short circuited with the output terminal. The positive DC power supplied to OPAMP is 10 V and negative DC power terminal is connected to ground. The output of this circuit will be—
a. 0 V b. 10 V c. V_i d. None

9. Which of the AM transmission modes will consume least power?
 a. DSB-TC b. SSB-TC c. SSB-SC d. DSC-SC
10. Which of the following options is NOT a component of a RADAR system?
 a. Transmitter b. Antenna c. Duplexer d. Sequencer

Part – B

Answer any 5 out of 7 questions (5 x 10= 50 marks)

- 11 (a)** Draw the typical frequency response curve of a CE amplifier. How do you find out the bandwidth of amplifier? [5]
- (b)** Define the following terms with respect to JFET— [5]
 (1) Pinch-off Voltage (V_P) (2) $V_{GS(off)}$
- 12 (a)** Draw a well labelled diagram of transformer coupled class B push-pull amplifier and explain its working. [5]
- (b)** An amplifier has gain of 100 and distortion of 15% without feedback. Gain gets reduced to 20 with feedback. Find feedback factor and distortion with feedback. [5]
- 13 (a)** Draw a well labelled diagram of RC Phase Shift oscillator and explain its working. What is the formula for its output frequency? [5]
- (b)** An RC Phase shift oscillator, using a BJT and RC network, is to be designed to operate at 1 KHz. If the three resistors in RC phase shift network are $R_1=R_2=R_3=R=10\text{ K}\Omega$, and all capacitors to have same values i.e. $C_1=C_2=C_3=C$, find the value of C. [5]
- 14 (a)** What is Clamper? Draw diagram and explain working of negative clamper? [5]
- (b)** Draw the circuit diagram and explain the working of IC 555 as Astable Multivibrator. [5]
- 15 (a)** What is a summing amplifier? Draw the OPAMP based circuit diagram and deduce the expression for output of a summing amplifier with N inputs $V_1, V_2, \dots V_N$ and output V_o . [5]
- (b)** Write short note on Output offset voltage and Input bias current. [5]
- 16 (a)** Define the following terms with respect to SCRs— [5]
 a. V_{BR} , Reverse Breakdown Voltage
 b. V_{FB} , Forward Breakover Voltage
 c. I_L , Latching Current
 d. I_H , Holding Current
 e. $I_g(\min)$, Minimum Gate Current
- (b)** Draw and explain construction and characteristic of IGBT. [5]
- 17 (a)** Prove that $P_t = P_c (1 + m^2/2)$ for an amplitude modulated signal. Also determine frequency components and their amplitudes in AM. [5]
- (b)** Draw block diagram and explain the purpose of each block of a super-heterodyne receiver. Explain the need of IF generation. [5]