

INDIAN MARITIME UNIVERSITY
(A Central University, Govt. of India)
End Semester Examinations- Dec 2019/Jan 2020
B.Tech (Marine Engineering)
Semester-III
UG11T1302/2302– Electronics

Date: 12.12.2019
Time: 3 Hrs.

Maximum Marks: 70
Pass Marks: 35

Part – A (compulsory)

Answer the following (10x2=20 Marks)

- 1** In CE amplifiers, the purpose of input coupling capacitor is to— [2]
a. Prevent battery current (DC) from flowing into input side
b. To forward bias the base-emitter
c. To restrict DC current from flowing into amplifier circuit
d. To restrict AC current from flowing into amplifier circuit
- 2** If A is the amplifier gain and β is the feedback gain then, which of [2]
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, $n = 0, 1, 2, 3, \dots$
- 3** Which class of amplifiers has minimum efficiency— [2]
a. Class A b. Class B c. Class AB d. None of these
- 4** Which of the following circuits is called a comparator with [2]
hysteresis?
a. Oscillator b. Amplifier
c. Sweep Generator d. Schmitt Trigger
- 5** Briefly describe the concept of virtual ground with respect to a [2]
OPAMP based inverting amplifier.
- 6** Which of the following digital device may be used to implement [2]
any two input, single output function.
a. Two input AND gate b. 4:1 Multiplexer
c. Half adder d. None of these
- 7** Which of the following is a specification of digital to analog [2]
convertor?
a. Turn ON time b. End of Conversion
c. Start of Conversion d. Conversion Time
- 8** A CMOS circuit is used to implement— [2]
a. An amplifier circuit b. An oscillator circuit
c. A logic gate d. All of these

- 9 Which of the following devices may be used in the firing circuit of SCRs. [2]
a. Transistor b. UJT c. FET d. IGBT
- 10 Which of the AM transmission modes consumes maximum power? [2]
a. DSB-TC b. SSB-TC c. SSB-SC d. DSC-SC

Part – B

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

- 11 (a) Draw a CE amplifier circuit and explain the purpose of various components. [5]
- (b) With respect to a transistor, derive the expression for α in terms of β and α in terms of γ . [5]
- 12 (a) Draw a well labelled diagram of Wein-Bridge 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]
- 13 (a) Draw a well labelled diagram of a class AB complementary symmetry push pull amplifier and explain its working. [5]
- (b) Explain the concept of cross-over distortion in class B power amplifier. Suggest a method to mitigate the effect of cross-over distortion. [5]
- 14 (a) Draw well labelled circuit diagram clamper circuit. [5]
- (b) Draw the well labelled circuit diagram and explain working of a 555 timer IC based monostable multivibrator. [5]
- 15 (a) Draw the circuit diagram of an OPAMP based differentiator circuit and derive the expression of its output in terms of input and circuit components. [5]
- (b) Develop an op-amp based circuit so as to produce output voltage $V_o = 2V_1 - 5V_2 + 10V_3$, where V_1 , V_2 and V_3 are external input voltages. [5]

16 (a) Explain operation of D flip-flop. Show the truth table and timing diagram. [5]

(b) Write an assembly language program to add two 8 bit numbers. [5]

17 (a) An AM wave equation is given as, [5]

$$v=5(1+0.6 \sin 150t) \sin(314 \times 10^4t) \text{ Volts.}$$

What are the minimum and maximum amplitudes of AM Wave? What are the amplitudes and frequencies of message signal, RF carrier and side bands?

(b) Draw block diagram and explain the purpose of each block of a super-heterodyne receiver. [5]