Enrollment No......................................

Faculty of Engineering / Science

End Sem (Even) Examination May-2022
EN3ES16 / SC3ES03 Basic Electronics Engineering

Programme: B.Tech. / B.Sc.   Branch/Specialisation: All / AIML/CS/CTIS/MAIS

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1   i.   Depletion region contains-   **1**
       (a) Free holes   (b) Free electrons
       (c) Immobile charge carriers   (d) All of these

   ii.   Zener diodes are also known as-   **1**
       (a) Voltage regulators   (b) Forward bias diode
       (c) Breakdown diode   (d) Current regulators

  iii.   BJT is-   **1**
       (a) Voltage control device
       (b) A current controlled device
       (c) A temperature-controlled device
       (d) A Forward device

   iv.   A JFET is also called _____ transistor.   **1**
       (a) Unipolar   (b) Bipolar   (c) Unijunction   (d) Current

    v.   When aliasing takes place?   **1**
       (a) Sampling signals less than Nyquist Rate
       (b) Sampling signals equal to Nyquist Rate
       (c) Sampling signals more than Nyquist Rate
       (d) Sampling signals at a rate which is twice of Nyquist Rate

   vi.   What is the role of channel in communication system?   **1**
       (a) Converts one form of signal to other
       (b) Allows mixing of signals
       (c) Acts as a medium to send message signals from transmitter to receiver
       (d) Helps to extract original signal from incoming signal

vii. How many AND, OR and EXOR gates are required for the configuration of full adder? **1**
(a) 1, 2,1   (b) 2, 1, 2   (c) 3, 1, 2   (d) 2,1 ,3

viii. DeMorgan's theorem states that _____. **1**
(a) $(A + B)' = A' * B$ (b) $A' + B' = A'B'$
(c) $(AB)' = A' + B'$ (d) $(AB)' = A' + B$

ix. _____ provides different types of waveforms such as sine, triangular, square, pulse etc at the output. **1**
(a) Oscillator   (b) Signal generator
(c) DC Tachometer generator   (d) Multimeter

x. In any device, the difference between the measured value & true value is referred as- **1**
(a) Error   (b) Expected value   (c) Lag   (d) Accuracy

Q.2 i. Explain LED under these points: **2**
(a) LED working principle
(b) Draw LED Symbol and advantages of LEDs

ii. Draw the following with proper labelling: **3**
(a) VI characteristics of a Zener diode
(b) Positive clamper circuit with input and output waveform
(c) Bridge rectifier circuit with input and output waveform

iii. Explain half wave rectifier and full wave rectifier under the following points: **5**
(a) Construction and circuit diagram
(b) Ripple factor and efficiency expression

OR iv. Explain the operation of PN-Junction diode under the following points: **5**
(a) Construction
(b) Forward bias condition with VI characteristic
(c) Reverse bias condition with VI characteristic

Q.3 i. Discuss the transistor under following points: **4**
(a) Transistor types with their symbolic representation
(b) Transistor working (any one type)
(c) Name of the transistor configurations

ii. Draw the NPN common emitter circuit and sketch the input and output characteristics. Also explain active region, cutoff region and saturation region by indicating them on the characteristic curve. **6**

OR iii. Compare the FET and enhancement type MOSFET under given points: **6**
(a) Construction (with label diagram)
(b) Operation

Q.4 i. Explain the following: **4**
(a) Pulse amplitude modulation with diagram.
(b) Need of modulation

ii. An audio frequency signal $10Sin(2\pi500)t$ is used to amplitude modulate a carrier of $50Sin(2\pi10^5)t$. **6**
Calculate.
(a) Modulation index
(b) Sideband frequencies
(c) Bandwidth required
(d) Total power deliver to the load at 600Ω

OR iii. Explain the following: **6**
(a) Compare AM, FM and PM
(b) Simplex and duplex system with an example
(c) State sampling theorem

Q.5 i. (a) Reduce the following Boolean expression using Boolean laws. **4**
$Y = AB + (A + B) (A + B)$.
(b) Draw the symbol and write logic expression and truth table of the two input universal logic gates

ii. Minimize the following expression using K-map. **6**
$f (P, Q, R, S) = \Sigma m (0, 1, 5, 9, 13,14, 15) + d (3,4,7,10,11)$
Also draw minimize expression using logic gate.

OR iii. (a) Explain Von Neumann architecture with diagram in detail. **6**
(b) Convert the following:
(i) $(11001010.1)_2 = (?)_{10}$
(ii) $(536)_8 = (?)_{16}$

Q.6 Attempt any two:
i. Write any two applications of function generator. **5**
ii Sketch Block diagram of CRO and state function of each block. **5**
iii Explain Cathode Ray tube with suitable diagram. **5**

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iii.   BJT is-   **1**
(b) A current controlled device

iv.   A JFET is also called _____ transistor.   **1**
(a) Unipolar

v.   When aliasing takes place?   **1**
(a) Sampling signals less than Nyquist Rate

vi.   What is the role of channel in communication system?   **1**
(c) Acts as a medium to send message signals from transmitter to receiver

vii.   How many AND, OR and EXOR gates are required for the   **1**
configuration of full adder?
(b) 2, 1, 2

viii. DeMorgan's theorem states that _____.   **1**
(c) (AB)' = A' + B'

ix.   _____ provides different types of waveforms such as sine,   **1**
triangular, square, pulse etc at the output.
(b) Signal generator

x.   In any device, the difference between the measured value & true value   **1**
is referred as-
(a) Error

Q.2 i.   Explain LED under these points: **2**
(a) LED working principle   1 mark
(b) Draw LED Symbol   0.5 mark
Advantages of LEDs   0.5 mark

ii.   Draw the following with proper labelling: **3**
(a) VI characteristics of a Zener diode   1 mark
(b) Positive clamper circuit with input and output waveform
                                                    1 mark
(c) Bridge rectifier circuit with input and output waveform
                                                    1 mark

iii.   Explain half wave rectifier and full wave rectifier under the following   **5**
points:
(a) Construction   1.5 marks
Circuit diagram   1.5 marks
(b) Ripple factor   1 mark
Efficiency expression   1 mark

OR   iv.   Explain the operation of PN-Junction diode under the following points: **5**
(a) Construction   1 mark
(b) Forward bias condition with VI characteristic   2 marks
(c) Reverse bias condition with VI characteristic   2 marks

Q.3 i.   Discuss the transistor under following points: **4**
(a) Transistor types with their symbolic representation
                                                    1 mark
(b) Transistor working (any one type)   2 marks
(c) Name of the transistor configurations   1 mark

ii.   Draw the NPN common emitter circuit   1.5 marks   **6**
Sketch the input and output characteristics.   1.5 marks
Active region, cutoff region and saturation region   3 marks

OR   iii.   Compare the FET and enhancement type MOSFET   **6**
(a) Construction (with label diagram)   3 marks
(b) Operation   3 marks

Q.4 i.   Explain the following: **4**
(a) Pulse amplitude modulation with diagram.   2 marks
(b) Need of modulation   2 marks

ii.   (a) Modulation index   1.5 marks   **6**
(b) Sideband frequencies   1.5 marks
(c) Bandwidth required   1.5 marks
(d) Total power deliver to the load at 600Ω   1.5 marks

OR   iii.   Explain the following: **6**
(a) Compare AM, FM and PM   2 marks
(b) Simplex and duplex system with an example   2 marks
(c) State sampling theorem   2 marks

Q.5 i.   (a) Reduce the following Boolean expression using Boolean laws.   **4**
Y = AB + (A + B) (A + B).   2 marks
(b) Draw the symbol and write logic expression and truth table of the
two input universal logic gates   2 marks

	ii.	Minimize the following expression using K-map.	4 marks	**6**
		Draw minimize expression using logic gate	2 marks	
OR	iii.	(a) Explain Von Neumann architecture with diagram	4 marks	**6**
		(b) Convert the following:		
		(i) $(11001010.1)_2 = (?)_{10}$	1 mark	
		(ii) $(536)_8 = (?)_{16}$	1 mark	

Q.6		Attempt any two:		
	i.	Any two applications of function generator		**5**
		2.5 marks for each	(2.5 marks * 5)	
	ii	Sketch Block diagram of CRO	2 marks	**5**
		Function of each block	3 marks	
	iii	Cathode Ray tube	2 marks	**5**
		Suitable diagram	3 marks	

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