B. Tech. DEGREE EXAMINATION, DECEMBER 2015
First Semester

15EC101 – BASIC ELECTRONICS ENGINEERING
(For the candidates admitted during the academic year 2015 – 2016)

Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
Part - B and **Part - C** should be answered in answer booklet.

Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer ALL Questions

1. Intrinsic semiconductor material is characterised by a valence shell of how many electrons?
   (A) 1
   (B) 2
   (C) 4
   (D) 6

2. For the proper operation of transistor, _____ junction should be forward biased, _____ junction should be reverse biased.
   (A) Base-Emitter, Collector-Base
   (B) Base-Collector, Base-Emitter
   (C) Collector-Emitter, Emitter-Base
   (D) Collector-Emitter, Collector-Base

3. When the JFET is no longer able to control the current, this point is called the
   (A) Depletion Region
   (B) Breakdown Region
   (C) Saturation Region
   (D) Pinch-off Region

4. The peak Inverse voltage across a Non Conducting diode in a bridge Rectifier equals approximately.
   (A) Half the peak secondary voltage
   (B) Twice the peak secondary voltage
   (C) The peak value of the secondary voltage
   (D) Four times the Peak value of the secondary voltage

5. The Light Emitting Diode is a PN Junction diode which emits light when
   (A) Forward biased
   (B) Reverse biased
   (C) Lightly doped
   (D) Unbiased

6. The property of photoconductive cell is, its _____ in the absence of light. _____ in the presence of light,
   (A) Resistance Increases, Conductance Increases
   (B) Conductance Decreases, Conductance Increases
   (C) Resistance Decreases, Resistance Increases
   (D) Conductance Decrease, Resistance Increases

7. In a Photo Diode, when no light is applied, the minimum reverse leakage current is called as
   (A) Saturation current
   (B) Dark current
   (C) Forward current
   (D) Bidirectional current

8. The viewing angle of Liquid Crystal Display (LCD) is
   (A) 150°
   (B) 100°
   (C) 200°
   (D) 250°

9. A Transducer's function is to
   (A) Transmit Electrical Energy
   (B) Convert Energy
   (C) Produce Mechanical Energy
   (D) Prevent Current flow

10. What causes the piezoelectric effect?
    (A) Pressure on a Crystal
    (B) Heat or Dissimilar metals
    (C) Water Running on iron
    (D) A magnetic field

11. The thermistor has _____ and _____ Temperature coefficient of resistance
    (A) Positive, Very Low
    (B) Negative, Very Low
    (C) Negative, Very High
    (D) Positive, Very High

12. Which of the following transducer is not an active Transducer?
    (A) Thermocouple
    (B) Piezoelectric transducer
    (C) Photoelectric transducer
    (D) Thermistor

13. The expression $Y = A\bar{B} + B\bar{A}$ can be realized using the following gates:
    (A) OR Gates only
    (B) AND Gates and NOT Gates
    (C) AND Gate, OR Gates, NOT Gates
    (D) OR Gates, and NOT Gates

14. What input values will cause an AND logic gate to produce a high output?
    (A) All inputs are high
    (B) All inputs are low
    (C) Atleast one input is high
    (D) Atleast one input is low

15. What is the decimal value of hexadecimal number $(4AB)_{16}$?
    (A) $(1159)_{10}$
    (B) $(1911)_{10}$
    (C) $(1951)_{10}$
    (D) $(1195)_{10}$

16. The number of bits used to store a binary coded decimal digit is
    (A) 8
    (B) 4
    (C) 1
    (D) 2

17. If data is transmitted in both directions at the same time, then it is called as
    (A) Full Duplex Arrangement
    (B) Half Duplex arrangement
    (C) Simple arrangement
    (D) Multiplexed arrangement

18. The range of frequency for Ultra High Frequencies (U.H.F) band lies in the range of
    (A) 30 – 300 MHz
    (B) 300 – 3000 MHz
    (C) 3 – 30 GHz
    (D) 3 – 30 MHz

19. In accordance with the sampling theorem, the rate of sampling should be greater than _____ the highest frequency component of the message signal.
    (A) Half
    (B) Equal
    (C) Twice
    (D) Four times

20. When the satellite rotates in an orbit that takes it over the north and south poles, it is called
    (A) Inclined orbit
    (B) Polar orbit
    (C) Equatorial orbit
    (D) Sun synchronous orbit

PART – B (5 × 4 = 20 Marks)
Answer ANY FIVE Questions

21. Describe the function of PN junction diode under forward bias and reverse bias.

22. What is a Clipper? With the help of circuit diagram and waveforms describe the operation of positive Clipper.

23. Describe the constructional features of the Photoconductive cell.

24. What are the basic requirements of a transducer?

25. State and explain De Morgan's theorems.

26. Convert $(112)_{10}$ and $(253)_8$ to hexadecimal numbers.

27. Explain briefly the need for modulation.

PART – C (5 × 12 = 60 Marks)
Answer ALL Questions

28. a.i. A 230V, 50Hz voltage is applied to the primary of a 4:1 step down transformer used in a bridge rectifier having a load resistance of 600Ω. Assuming the diodes to be ideal, determine
    (1) DC output voltage
    (2) DC power delivered to the load
    (3) PIV
    (4) Output frequency

   ii. Explain the input and output characteristics of a transistor in CE configuration.

(OR)

   b. With the help of neat sketches and characteristic curves, explain the construction and operation of the N-Channel JFET.

29. a. Describe in detail the principle of operation of LED and LCD with neat diagrams. Also compare LED and LCD.

(OR)

   b. With neat diagrams, explain the operation of Photodiode, Phototransistor, Optocoupler.

30. a.i. Explain in detail the working of a Linear Variable Differential Transformer.

   ii. Explain the Hall effect and its applications.

(OR)

   b.i. Discuss with suitable diagrams the salient features of unbounded and bonded strain gauges.
   ii. What is a thermocouple? How is a thermocouple used for temperature measurement?\

31. a. Simplify the following expressions using Boolean algebra:
    (i) $A + AB + A\overline{B}C$
    (ii) $(\overline{A}+B)C + ABC$
    (iii) $A\overline{B}C(BD + CDE) + A\overline{C}$

(OR)

b. Realise the logic expressions using basic gates.

(i) $Y = \overline{B}\,\overline{C} + \overline{A}\,\overline{C} + \overline{A}\,\overline{B}$

(ii) $Y = (A+B)(\overline{A}+C)(B+D)$

32. a.i. With neat waveforms, discuss the principles of Amplitude Modulation. Also, Gi expression for modulation index in AM.

ii. Draw the block diagram of FM Transmitter and explain its operation.

(OR)

b. i. With neat diagrams, explain in detail about Satellite Communication System.

ii. Explain in detail the basic RADAR System.

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