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BEE-042

DIPLOMA IN ELECTRICAL AND MECHANICAL ENGINEERING (DEME)

Term-End Examination

June, 2019

BEE-042 : ELECTRONICS

Time : 2 Hours *Maximum Marks : 70*

***Note** : Question No. 1 is **compulsory**. Attempt **five** questions in all. Use of scientific calculator is permitted.*

1. (a) Select the correct answer from the given options : 1×7

(i) How many NAND gates are required to realize an OR gate ?

(A) 1

(B) 2

(C) 3

(D) 4

(ii) Conductivity σ of a conductor can be expressed in terms of resistance R, length l and area of cross-section A as :

(A) $\sigma = Rl/A$

(B) $\sigma = \frac{l}{RA}$

(C) $\sigma = \frac{R}{lA}$

(D) $\sigma = \frac{Rl}{A^2}$

(iii) When the emitter-base junction of a PNP transistor is forward biased :

(A) a large number of holes get injected into the base region.

(B) a small number of electrons from n region get injected into the emitter region.

(C) a large number of electrons get injected into the emitter region.

(D) Both (A) and (B) above

(iv) The RMS voltage across load at the output of a 12 : 1 turn transformer fed with 230 V a.c. input is :

(A) 19 V

(B) 21 V

(C) 19.16 V

(D) 19.16 mV

(v) In a common emitter amplifier :

(A) Output signal is in phase with input signal.

(B) Output signal is 90° out of phase with input signal.

(C) Output signal is 180° out of phase with input signal.

(D) Output signal is 270° out of phase with input signal.

(vi) Multiplication of 1011 by 101 given :

(A) 110111

(B) 101011

(C) 110110

(D) 110011

(vii) Ratio of latching current to holding current in SCR is :

(A) less than one

(B) more than one

(C) equal to one

(D) less than or equal to one

(b) State true *or* false against the given statements : 1×7

(i) Conductors have a large 'forbidden gap'.

(ii) A transistor is in saturation region when emitter is forward biased and collector, reverse biased.

(iii) A transducer is a device that converts d.c. voltage from a.c.

(iv) A full subtractor can be constructed using two half subtractors and a NAND gate.

(v) LVDTs require low power to operate and they have low hysteresis for excellent repeatability.

(vi) For a half wave rectifier, ripple factor is 81.2%.

(vii) In a 8085 microprocessor system with memory mapped I/O, there can be maximum 256 input and 256 output devices.

2. Explain the functioning of a half wave rectifier with the help of a neat diagram. Derive the expression for output voltage, output current, ripple and efficiency. 14

3. (a) Explain the working of a JK master-slave flip-flop. 7

(b) Describe the operation of a full adder along with its truth table. 7

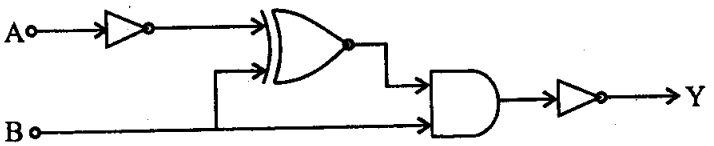
4. (a) Derive the relation between α_{dc} and β_{dc} for an NPN transistor in CE configuration. 7

   (b) Explain the working of capacitor filter with the help of a waveform. 7

5. (a) Discuss working of a single phase AC motor. 7

   (b) Explain the working of an electrical humidity transducer. 7

6. (a) Give the truth table for the digital circuit below : 7



   (b) Explain the functioning of an AC tacho-generator. 7

7. (a) Explain the construction and working of UJT. 7

   (b) Explain the block diagram of digital frequency meter. 7

8. Write short notes on any *two* of the following : 2×7

(a) ALU

(b) DVM

(c) Superheterodyne receiver

(d) Ripple factor