

**DIPLOMA IN MECHANICAL ENGINEERING
(DME)**

**Term-End Examination
December, 2018**

00213

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. 7×1=7
- (a) According to Boolean algebra,
 $1 + A + B + C =$
 (i) A
 (ii) $A + B + C$
 (iii) 1
 (iv) None of the above
- (b) Current density J is expressed in terms of the number of electrons per unit volume n (number/m³), electronic charge coulomb 'q', and electric field E as
 (i) $J = nqE$
 (ii) $J = nE / qn$
 (iii) $J = nqnE$
 (iv) $J = nq / E$

- (c) When P side of a diode is connected to positive terminal (positive biased)
- (i) It offers zero resistance
 - (ii) It offers very low resistance
 - (iii) It offers very high resistance
 - (iv) There is no effect on resistance
- (d) The current through a diode in series with a $1\text{ k}\Omega$ resistor and forward biased with a 5 V battery is
- (i) 5 mA
 - (ii) 4 mA
 - (iii) 5 A
 - (iv) $6\text{ }\mu\text{A}$
- (e) A half wave rectifier has the following disadvantage :
- (i) Excess ripple factor
 - (ii) Low ratio of rectification
 - (iii) Low transformer utilisation factor
 - (iv) All of the above
- (f) The decimal equivalent of binary number 100101 is
- (i) 38
 - (ii) 41
 - (iii) 26
 - (iv) 37

- (g) An RS latch can be formed using a combination of
- (i) OR and NAND gates
 - (ii) NOR or NAND gates
 - (iii) AND and NOR gates
 - (iv) AND or NOR gates

(B) State *True* or *False* for the following statements :

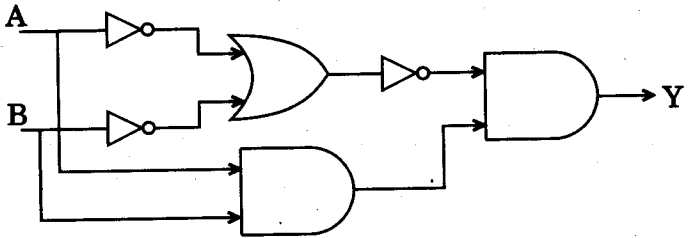
7×1=7

- (a) Semiconductors have a large "Forbidden Gap".
- (b) Common emitter current gain $\beta_{dc} = I_B / I_C$.
- (c) Electric field inside the depletion layer is very high of the order of 10^5 volts per metre.
- (d) The switching action of gate in SCR takes place only when SCR is reverse biased.
- (e) Piezo electric transducers comprise of natural, synthetic and polarised ferroelectric ceramics.
- (f) PROM contains a programmable AND array and a fixed OR array.
- (g) A zener diode is operated in the "breakdown region".

2. Explain the functioning of a full wave rectifier with a neat diagram. Show that the average value of its output current is twice that of a half wave rectifier. 14
3. (a) Describe the operation of a full subtractor along with truth table. 7
- (b) Explain the function of 555 IC as a timer. 7
4. (a) Explain the working of a BJT. 7
- (b) The α of BJT is 0.998. If α changes by 1%, how much does β change? 7
5. (a) Explain the concept of a Thermocouple type pressure gauge. 7
- (b) Discuss the working of RS Flip-Flop. 7
6. (a) With the help of a diagram, explain the working of a CRO. 7
- (b) Draw the circuit diagram for an NPN transistor in CE configuration. Derive an expression for current amplification factor in terms of current gain. 7

7. (a) Explain the working of a shunt wound DC motor. 7

(b) Give the truth table for the digital circuit below : 7



8. Write short notes on any *two* of the following : $2 \times 7 = 14$

- (a) Doping
 - (b) Electrical Humidity Transducer
 - (c) Zener Diode
 - (d) Digital Voltmeter
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