

**DIPLOMA IN MECHANICAL ENGINEERING
(DME)**

Term-End Examination

00623

December, 2016

BEE-042 : ELECTRONICS

Time : 2 hours

Maximum Marks : 70

Note : *Question no. 1 is compulsory. Answer any four of the remaining questions numbered 2 to 8. Use of scientific calculator is permitted.*

1. (a) State *True* or *False* for each of the given statements.

7×1=7

- (i) Semiconductors have a large "Forbidden Gap".
- (ii) Common emitter current gain $\beta_{dc} = I_B / I_C$.
- (iii) An RS latch can be built using NOR or NAND gates.
- (iv) The switching action of a gate in an SCR takes place only when the SCR is reverse biased.

- (v) In a transistor having finite β , the forward bias across the base-emitter junction is kept constant and the reverse bias across the collector-base junction is increased. In this case, the base current will decrease.
- (vi) Piezoelectric transducers combine natural, synthetic and polarized ferroelectric ceramics.
- (vii) PROM contains a programmable AND array and a fixed OR array.
- (b) Select the correct answer from the given options. $7 \times 1 = 7$

- (i) According to Boolean algebra,

$$1 + A + B + C =$$

- (1) A
- (2) $A + B + C$
- (3) 1
- (4) None of these
- (ii) Current density J is expressed in terms of the number of electrons per unit volume n (number/m²) and electronic charge q in Coulombs as

- (1) $J = nqE$
- (2) $J = nE / q\mu_n$
- (3) $J = nq\mu_n E$
- (4) $J = nq / E$

- (iii) When P side of a diode is connected to a positive terminal (positive biased)
- (1) it offers zero resistance
 - (2) it offers very low resistance
 - (3) it offers very high resistance
 - (4) there is no effect on resistance
- (iv) The current through a diode in series with a $1\text{ k}\Omega$ resistor and forward biased using a 5 V battery is
- (1) 5 mA
 - (2) 4 mA
 - (3) 5 A
 - (4) $6\ \mu\text{A}$
- (v) A half-wave rectifier suffers from the disadvantage of
- (1) Excess ripple factor
 - (2) Low ratio of rectification
 - (3) Low transformer utilization factor
 - (4) All of the above
- (vi) The decimal equivalent of the binary number 100101 is
- (1) 38
 - (2) 41
 - (3) 26
 - (4) 37

(vii) An RS latch can be formed using a combination of

- (1) OR and NAND gates
- (2) NOR or NAND gates
- (3) AND and NOR gates
- (4) AND or NOR gates

2. Explain the functioning of a full wave rectifier with the help of a neat diagram. Show that the average value of its output current is twice that of a half-wave rectifier.

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3. A bridge rectifier is connected to a 230 V, 50 Hz source voltage and load resistance of 20 k Ω . Calculate :

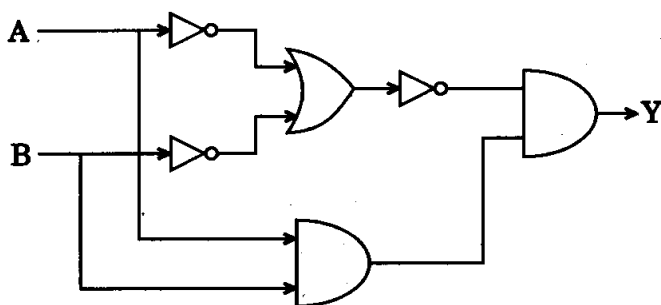
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- (a) Output dc voltage
- (b) Output dc current
- (c) Ripple voltage
- (d) Diode rating

4. Draw the circuit diagram for an NPN transistor in CE configuration. Derive an expression for current amplification factor in terms of current gain.

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5. Give the truth table for the digital circuit. 14



6. Explain the concept of working of a thermocouple type pressure gauge. 14

7. With the help of a neat diagram, explain the working of a CRO. 14

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

(a) Magnetic Recorders

(b) Construction and working of electromagnetic flow meter

(c) Block diagram of monochromatic television transmission and reception circuit
