## 00751

# DIPLOMA IN MECHANICAL ENGINEERING (DME)
## Term-End Examination
## December, 2015

### BEE-042 : ELECTRONICS

*Time : 2 hours*          *Maximum Marks : 70*

*Note :* *Question no. 1 is **compulsory**. Attempt any **four** questions from the remaining questions numbered 2 to 8. Use of scientific calculator is allowed. All questions carry equal marks.*

1. (a) State *True* or *False* against the given statements :     7×1=7

   (i) The charge of an electron is $1.6 \times 10^{-19}$ J.

   (ii) Depletion layer is formed by positive charges.

   (iii) Common base configuration has very high output impedance.

   (iv) Fixed bias circuit is free from temperature effect.

   (v) The maximum efficiency of full wave rectification is 81.2%.

   (vi) In B.J.T., maximum doping is done in collector.

   (vii) U.J.T. does not have the ability to amplify.

(b) Select the correct answer from the given four alternatives. *7×1=7*

(i) A semiconductor has a

    (1) constant temperature coefficient of resistance

    (2) negative temperature coefficient of resistance

    (3) positive temperature coefficient of resistance

    (4) None of these

(ii) A zener diode has

    (1) negative resistance

    (2) very high amplification

    (3) sharp breakdown voltage at reverse voltage

    (4) None of these

(iii) Peak inverse voltage of a full wave centre tap rectifier is

    (1) $V_m$

    (2) $\dfrac{V_m}{\sqrt{2}}$

    (3) $\dfrac{V_m}{\pi}$

    (4) $2\,V_m$

(iv) Out of two different Q-points shown in a d.c. load line, the upper Q-point represents the

(1) cut-off point

(2) maximum voltage gain

(3) minimum current gain

(4) maximum current gain

(v) The SCR can be triggered 'on' by a pulse at the

(1) Anode

(2) Gate

(3) Cathode

(4) All of these

(vi) In CE configuration, an emitter resistor is used for

(1) higher gain

(2) a.c. signal bypass

(3) stabilization

(4) None of these

(vii) Synchronous speed of a 3-phase motor can be given by

(1) $N_s = \dfrac{120\,f}{p}$

(2) $N_s = \dfrac{120\,p}{f}$

(3) $N_s = \dfrac{f}{p \times 120}$

(4) None of these

2. (a) Discuss the energy band theory with the energy band diagrams of a conductor, a semiconductor and an insulator. 7

(b) What is doping ? How are p-type and n-type semiconductors formed ? 7

3. (a) A bridge rectifier is connected to 230 V AC, 50 Hz source voltage and load resistance of 20 kΩ. Calculate : 6

(i) Output d.c. voltage

(ii) Output d.c. current

(iii) Ripple voltage

(b) Discuss the working principle of BJT. Derive an expression for transistor current gains. 8

4. (a) Explain the working of SCR with its I – V characteristics. 7

(b) What is UJT ? Discuss its characteristics. 7

5. Draw logic circuit of half adder and full adder. Explain its working with Truth Table. 14

6. (a) With the help of a block diagram, explain the monochrome T.V. transmitter circuit. 7

(b) What is Transducer ? Explain the working of LVDT. 7

7. (a) Explain the concept of thermocouple type pressure gauge. 7

(b) Classify the various types of d.c. motors and explain the working of a d.c. series motor. 7

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

(a) Single Phase Induction Motor

(b) Storage CRO

(c) X-Y Recorder

(d) DC Tachogenerator

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