Total No. of printed pages = 3

ET-305/AE-I/3rd Sem/2013/N

ANALOG ELECTRONICS – I

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. (a) What is a vacuum tube ? Discuss the construction and working of a vacuum diode.

   (b) Derive a relationship among the vacuum tube constants μ, r_p and g_m. 2+8+4=14

2. (a) Compare insulator, conductor and semiconductor on the basis of energy band diagram. What are the two types of semiconductors ? 5+2=7

   (b) How P-N junction diode is formed ? Draw the VI characteristic curve of it. 5+2=7

[Turn over

3. (a) What are half wave and full wave rectifiers? Give a neat sketch of their input and output waveforms.

(b) Derive an expression for the efficiency of both half wave and full wave rectifiers and compare your result. 4+10=14

4. (a) Draw NPN and PNP transistor and label all the currents. Define α and β of a transistor and derive the relationship between them. 3+2+2=7

(b) Draw common emitter (CE) configuration of NPN transistor and draw its input and output characteristic curve. 3+4=7

5. (a) What are the various coupling schemes used in cascaded amplifier ? Draw the circuit diagram of each. 3+5=8

(b) Discuss the construction and working of any one amplifier based on the coupling method. 6

6. (a) What is a feedback amplifier ? Derive the expression for the gain of an amplifier using negative feedback. 3+4=7

(b) What is an oscillation ? How does it differ from an amplifier ? Draw the circuit diagram of a colpitts oscillator. 2+2+3=7

7. Write short notes on any *two* : 7×2=14

(a) Bohr's atomic model

(b) Transistor biasing

(c) Zener diode

(d) Filters.