Seat No. : _____

N13-112

November-2014

B.Sc., Sem.-V (CBCS)

Ele. : 301 – Electronics

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) **All** questions carry equal marks.

(2) Symbols have their usual meaning.

(3) Marks of each question is indicated in a right end of the first line of each question.

1. (a) Explain working of differential amplifier with constant current source. Why is RE replaced by a constant current bias circuit ? **8**

OR

Draw the circuit diagram of emitter coupled differential amplifier along with its low frequency small signal equivalent circuit and derive the equation for closed loop voltage gain.

(b) Explain, in detail the necessity of active load in differential amplifier. **6**

OR

Explain transfer characteristics of op-amp operation with related derivation.

2. (a) Draw the circuit diagram of instrumentation amplifier using transducer. Derive the equation of output voltage. **7**

OR

Explain following applications of an op-amp with suitable circuit diagram :

(i) AC voltage amplifier

(ii) Clipper

(b) Explain following applications of an op-amp with suitable circuit diagram : **7**

(i) Halfwave rectifier

(ii) Voltage to current converter

OR

Describe application of an op-amp as a Adder and subtractor.

3. (a) Explain the working of three terminal adjustable voltage regulator with neat circuit diagram. **7**

Obtain expressions of its stabilization factor and output resistance.

OR

Explain the function of 4 terminal adjustable voltage regulator with the help of necessary circuit diagram. How can be current capability increased ?

(b) Explain constant current regulator using 3-terminal regulator. Derive the equation of output current and output resistance. **7**

OR

Discuss positive voltage regulator using IC μA 723 using foldback current limiting circuit.

4. (a) Explain operation of switching regulator using LM 105. **7**

OR

Describe different schemes of switching regulators and their advantages.

(b) Drive the relation between input and output voltage for a buck switching regulator with the help of circuit diagram. **7**

OR

State the important characteristics and explain operation of free running switching regulator with the circuit diagram.

5. Answer each of the following questions in short : **14**

(1) What is the function of last stage in an op-amp ?

(2) What is thermal overload protection?

(3) A 4 terminal IC regulator is superior to the 3 terminal regulator. Give reason.

(4) What do you mean by dual tracking regulator ?

(5) What are the ideal characteristics of voltage reference circuit used in voltage regulator ?

(6) What do you mean by series pass transistor ?

(7) What options are available in 78XX ?

(8) What is the principle of switch mode power supplies ?

(9) Give one application of current to voltage converter.

(10) Draw the input and output wave forms for positive clipper circuit.

(11) A FET-input IC op-amp has a typical open loop differential gain of 1,00,000 and a common-mode gain of 20. What is its CMR in decibels ?

(12) In V to I converter, if V_{in} = 1 V, R = 1 KΩ then find output voltage.

(13) Name two categories into which voltage regulators are classified.

(14) Give any three IC numbers that can be used as Negative voltage switching regulators.
