ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2007
ANALOG ELECTRONIC CIRCUIT
SEMESTER – 4

Time : 3 Hours]   [Full Marks : 70

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :   10 × 1 = 10

    i)   Saturation region operation of a BJT implies

        a)   base-emitter junction forward biased, base-collector junction reverse biased

        b)   base-emitter junction forward biased, base-collector junction forward biased

        c)   base-emitter junction reverse biased, base-collector junction reverse biased

        d)   none of these.

    ii) A differential amplifier has the differential gain of 100. If its CMRR = 240, then the common mode gain is

        a)   0·24   b)   0·417

        c)   24000   d)   1.

    iii) In an amplifier, if conduction is during the cycle from 0° to 9° and again from 180° to 270°, the amplifier will be termed as

        a)   Class *A*   b)   Class *B*

        c)   Class *C*   d)   Class *AB*.

    iv) Thermal runaway in a transistor biased in the active region is due to

        a)   heating of the transistor

        b)   change in β which increases with temperature

        c)   base emitter voltage which decreases with rise in temperature

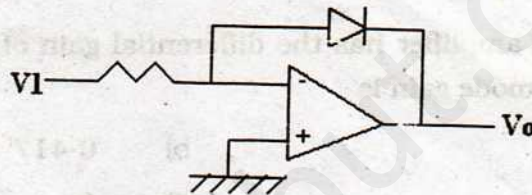   d)   change in reverse collector saturation due to rise in temperature.

24508-(I)-B

v) The value of V_0 is given for the following circuit by
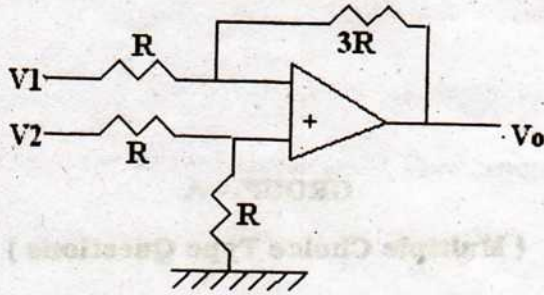
a) $-3V_1 + 2V_2$

b) $-3V_2$

c) $1\cdot 5 V_2 - 2\cdot 55 V_1$

d) $2V_2 - 3V_1$.

vi) The circuit figure shown below uses an ideal Op-Amp. For small positive values of V_1, the circuit works as

a) a half-wave rectifier

b) a differentiator

c) a logarithmic amplifier

d) an exponential amplifier.

vii) An instrumentation amplifier

a) is a differential amplifier

b) has a gain less than 1

c) has very high output impedance

d) has low CMRR.

viii) The Q point in a voltage amplifier is selected in the middle of the active region because

    a)   it gives better stability

    b)   the circuit needs a small d.c. voltage

    c)   the biasing circuit then needs less number of resistors

    d)   it gives a distortionless output.

ix) A class *B* push-pull power amplifier has an a.c. output of 10 watts. The d.c. power drum from the power supply under ideal condition is

    a)   10 watts   b)   12·75 watts

    c)   15 watts   d)   20 watts.

x) An ideal regulated power supply should have regulation which is

    a)   maximum   b)   50%

    c)   zero   d)   75%.

xi) Multivibrators

    a)   generate square wave

    b)   convert sine to square wave

    c)   convert triangular to sine wave

    d)   convert triangluar to square wave.

xii) Can we use a VCO as a function generator ?

    a)   Yes

    b)   No

    c)   Depends upon the kind of VCO

    d)   Cannot say.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Calculate the output voltage of the circuit, shown below where V_1 = 40 mV and V_2 = 20 mV.   5
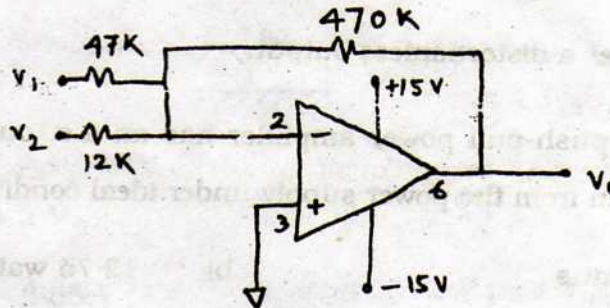
3. What are the differences between series and shunt regulators ? Draw a circuit of a shunt regulator and explain its operation. $2 + 3$

4. a) What do you mean by 'biasing' ?

   b) Draw and explain any one type of biasing arrangement and determine its stability factor. $1 + 4$

5. Explain the differences between constant current bias and current mirror.   5

6. What is a multivibrator ? Explain the operation of a monostable multivibrator and draw the output voltage waveform. $1 + 4$

GROUP – C

(Long Answer Type Questions)

Answer any *three* questions. $3 \times 15 = 45$

7. a) What is the significance of CMRR in differential amplifier ?   3

   b) With the circuit diagram, discuss the operation of an instrumentation amplifier and derive its gain equation. Discuss its merit and application.   12

8. a) Describe the function of an Op-Amp on (i) an inverter, (ii) an adder, (iii) an integrator (iv) a differentiator and (v) an amplifier.   10

   b) What are the desirable properties of an ideal Op-Amp ?   5

9. a)   In what respects Class *B* Push-Pull amplifier configuration better than a Class *A* Push-Pull Amplifier ? What is major drawback of Class *B* operation and how is this remedied ?   2 + 3

    b)   Prove that the maximum efficiency of class *B* amplifier is 78·5%.   7

    c)   What is the function of tuned amplifier ?   3

10. a)   Draw the circuit diagram of a voltage to current converter (grounded load) and explain its operation.   5

    b)   Draw the circuit arrangement and explain the operration of a Schimdt trigger circuit.   5

    c)   Give internal block arrangement of 555 and explain function of each block.   5

11. Write short notes on any *three* of the following :   3 × 5

    a)   Logarithmic amplifier

    b)   PLL

    c)   Switched mode power supply

    d)   Precision rectifier

    e)   High frequency model of transistor.