Register Number: ……..

B.E DEGREE EXAMINATIONS: MAY/JUNE 2014

(Regulation 2013)

Second Semester

MECHATRONICS ENGINEERING

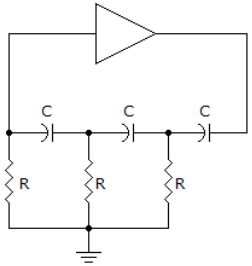
U13MCT201:Electronic Devices and Circuits

Time: Three Hours **Maximum Marks: 100**

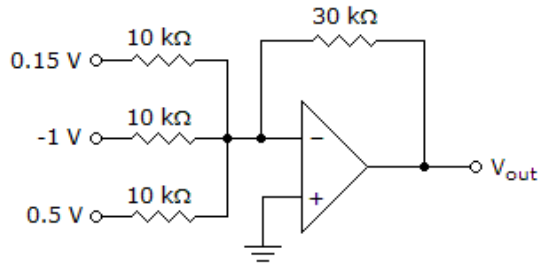
Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. What does a high resistance reading in both forward-bias and reverse-bias directions indicate?
   a) A good diode b) An open diode
   c) A shorted diode d) A defective ohmmeter
2. For the BJT to operate in the active (linear) region, the base-emitter junction must be ……. -biased and the base-collector junction must be …….-biased.
3. How many layers of material does a transistor have?
   a) 1 b) 2
   c) 3 d) 4
4. What is the forward breakdown voltage of PN junction diode ……..
5. In a simple series regulator circuit, which of the following components is the controlling element?
   a) Load resistor b) Zener diode
   c) Transistor Q_1 d) None of the above
6. This circuit is a …….. oscillator



7. One condition for positive feedback is that the phase shift around the feedback loop must be _____°
   a) 0 b) 90
   c) 180 d) 45
8. Refer to the given figure. Determine the output voltage, V_{OUT}……..

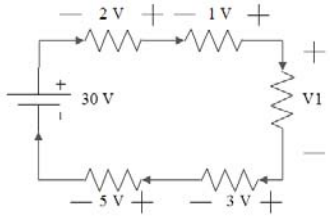


9. A Schmitt trigger is
   a) a comparator with only one trigger point. b) a comparator with hysteresis
   c) a comparator with three trigger points. d) none of the above.
10. Characteristics(ideal) of an op-amp do not drift with……..

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. For the circuit shown, determine the unknown voltage drop V_1.



12. Compare half-wave, full-wave rectifiers.
13. Show that the PN diode works as a rectifier.
14. Distinguish between avalanche and Zener mechanisms.
15. Compose the salient features of hybrid parameters?

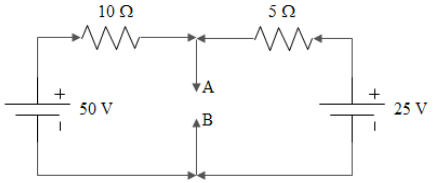
16. What is a differential amplifier?
17. Briefly explain Barkhausen criterion for oscillator?
18. Make use of op-amp to construct a comparator?
19. Draw an op-amp circuit whose output is $V_1 + V_2 + V_3$.
20. What is feedback? List two types of feedback.

PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q.No. 21 is Compulsory

21. Predict the Thevenin's equivalent circuit across 'AB' for the given circuit.



22. a) (i) Elaborate the input and output characteristics of transistor in CE configuration. (10)
    (ii) Draw two biasing circuit for BJT. (4)

(OR)

b) Explain the construction and operation of a JFET with necessary diagram.

23. a) (i) Discuss the action of a full-wave rectifier and give waveforms of input and output voltages (10)
    (ii) Draw the circuit of a zener shunt regulated power supply (4)

(OR)

b) Derive the equation for voltage gain, current gain, input impedance and output admittance for BJT using low frequency *h*-parameter model for CE configuration.

24. a) Build the circuit of Hartley oscillator and explain its working. State the expressions for frequency of oscillation.

(OR)

b) Discuss the construction of RC phase shift oscillator using BJT and explain its working.

25. a) Elaborate the operation of square wave generator using op-amp with necessary diagram

(OR)

b) Draw the inverting and non-inverting amplifier circuits of an op amp in closed loop configuration. Obtain the expressions for the closed loop gain in these circuits

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