Register Number……

B.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Second Semester

MECHATRONICS ENGINEERING

U07EC203: Electronic Devices and Circuits

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

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1. A series circuit consists of two resistors 100Ω and 150Ω in series. If the current lowing is 100 mA, then voltage applied is

   A. 100V B. 75 V C. 50 V D. 25 V

2. Norton's equivalent of a circuit is

   A. constant – current source with a conductance in parallel

   B. constant – current source in series with an infinite resistance

   C. constant – voltage source in parallel with a high resistance

   D. single – current source and a single voltage source

3. The current conduction in bipolar transistor is due to

   A. only holes B. only electrons C. only protons D. both holes and electrons

4. The input resistance of an ideal JFET is

   A. small B. medium C. high D. zero

5. In a full-wave rectifier, the current in each of the diodes flows for

   A. complete cycle of the input signal

   B. half cycle of the input signal

   C. less than half cycle of the input signal

   D. more than half cycle of the input signal

6. A voltage multiplier is a circuit which produces an output dc voltage whose value is

   A. multiple of peak ac input voltage ($2V_m$, $3V_m$ etc.,) B. more than peak ac input voltage

   C. less than peak ac input voltage D. equal to peak ac input voltage

7. In a class B amplifier, the current in the output circuit flows for

   A. 90° B. 180° C. 360° D. less than 90°

8. Feedback in an amplifier always helps to

   A. increases its output impedance B. increases its gain

   C. control its output D. decreases its input impedance

9. The Schmitt trigger is used for

A. producing sine wave B. counting pulses

C. producing triangular wave D. wave shaping circuits

10. For an inverting amplifier the closed loop gain is

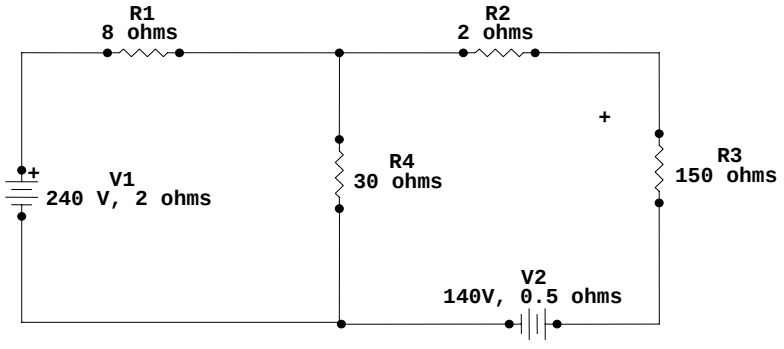
A. $-[R_F/R_1]$ B. $[R_F/R_1]$ C. $R_F = R_1$ D. $R_F = -R_1$

PART B (10 x 2 = 20 Marks)

11. Give the defining equations for analyzing a two-port network in terms of h- parameters.
12. State Thevenin's theorem.
13. Define peak inverse voltage (PIV) of a PN junction.
14. What are the advantages of FET?
15. What is clipper?
16. What is the function of rectifier?
17. How are amplifiers classified according to the input?
18. Why negative feedback is preferred for amplifiers?
19. What is summer?
20. What are the types of multivibrators?

PART C (5 x 14 = 70 Marks)

21. (a) Find the current in the 150 ohms (R3) load resistor and the power consumed in it by using Thevenin's theorem shown in Fig.1.



(OR)

(b) Obtain the hybrid parameters for the network shown in Fig.2. All resistor values are in ohms.

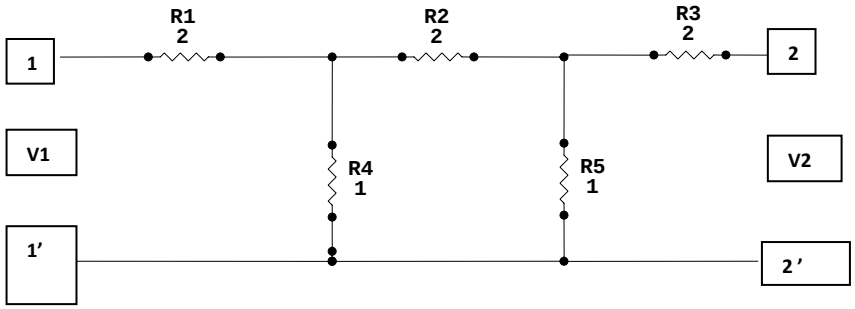


Fig.2

22. (a) A CE transistor amplifier with voltage divider bias circuit of Fig. 3 is designed to establish the operating point at V_{CE} = 12 V, I_C = 2 mA and stability factor ≤ 5.1. If V_{CC} = 24 V, V_{BE} = 0.7 V, β = 50 and R_C = 4.7kΩ, determine the values of resistors R_1, R_2 and R_E.

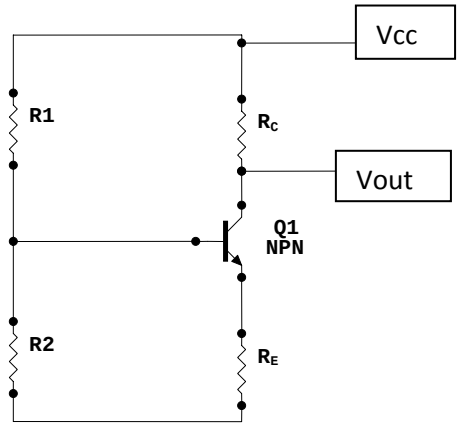


Fig. 3

(OR)

(b) Describe the action of PN junction diode under forward bias and reverse bias. Also explain V-I characteristics of a PN junction diode. (8+6)

23. (a) Explain the working of a half-wave rectifier with a neat circuit diagram and relevant waveforms. Find the value of ripple factor. (10+4)

(OR)

(b) Discuss with the help of circuit diagrams and relevant waveforms, the operation of different types of biased clipping circuits.

24. (a) Draw the small signal equivalent circuit of FET amplifier in CS connection and derive the equations for voltage gain, input impedance and output impedance.

(OR)

(b) Explain the principle of operation of hartley oscillator and derive the equation for frequency of oscillation.

25. (a) i) Draw an op-amp circuit whose output voltage $V_0 = V_1 + V_2 – V_3 - V_4$ (6)

ii) What is a Schmitt trigger? Draw an op-amp based Schmitt trigger circuit and explain the operation. (8)

(OR)

(b) What are the different types of multivibrators? With a neat Sketch, explain the working of a monostable multivibrator. (2+12)

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