B.E. DEGREE EXAMINATIONS: APRIL /MAY 2009

Third Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U07EI303 Electronic Circuits

Time: Three Hours   Maximum Marks: 100

Answer ALL the Questions:-

PART A (20 × 1 = 20 Marks)

1. Which basic FET amplifier configuration is also known as the source follower and which bipolar transistor amplifier configuration it is analogous to?
   - (a) Common Drain Amplifier, Emitter Follower
   - (b) Common Source Amplifier, Common Emitter Amplifier
   - (c) Common Gate Amplifier, Common Base Amplifier
   - (d) Common Source Amplifier, Emitter Follower

2. A Common Emitter Amplifier has an upper 3db frequency of 20KHz. If two such stages are cascaded together, the new upper 3db frequency would be
   - (a) 13 KHz
   - (b) 31.25 KHz
   - (c) C 8.28 KHz
   - (d) 26 KHz

3. Maximum theoretical conversion efficiency of a transformer coupled class A amplifier is
   - (a) 25%.
   - (b) 50%
   - (c) 75%
   - (d) 100%

4. Harmonic Distortion in amplifier is caused by
   - (a) non linearity of the active device
   - (b) defective active device
   - (c) presence of shot noise
   - (d) positive feedback from output to input

5. In a differential amplifier ----------------must be maximum.
   - (a) common mode gain
   - (b) gain of individual transistors
   - (c) average gain of transistors
   - (d) differential mode gain

6. To improve the value of CMRR in a differential amplifier,
   - (a) Its common mode gain A_c must be increased
   - (b) Its common mode gain A_c must be reduced
   - (c) The value of emitter resistance must be reduced
   - (d) Its differential mode gain A_d must be reduced

7. The lower and upper 3db frequencies of a tuned amplifier are 10 KHz and 12 KHz respectively. The frequency response has Q-factor of
   - (a) 11
   - (b) 5.5
   - (c) 5
   - (d) 6

8. What will be the quality factor of a tank circuit which uses an inductance having a resistance of 10 ohms and offering an inductive reactance of j100 ohms at the operating frequency. The capacitance of the tank circuit offers a reactance of −j100 ohms at the operating frequency.
   - (a) 10
   - (b) 100
   - (c) 0.1
   - (d) 50

9. Negative feedback in amplifiers leads to
    (a) Build-up of oscillations
    (b) Reduced voltage gain
    (c) De-stabilization of voltage gain
    (d) Increased voltage gain

10. The emitter follower configuration inherently has a
    (a) current series feedback
    (b) voltage shunt feedback
    (c) voltage series feedback
    (d) current shunt feedback

11. The feedback network of a certain oscillator circuit is frequency selective and satisf Barkhausen Criterion for sustained oscillations at a single frequency. It implies that
    (a) It is a sinusoidal oscillator
    (b) It is a square wave oscillator with symmetrical output
    (c) It is a square wave oscillator with unsymmetrical output
    (d) It is a sinusoidal oscillator with very high frequency stability

12. Of the following RC phase shift oscillator configurations, the one with highe frequency stability is
    (a) Conventional RC phase shift oscillator built around a bipolar transistor
    (b) Conventional RC phase shift oscillator built around an Op-amp
    (c) Conventional RC phase shift oscillator built around a FET
    (d) Wien-Bridge oscillator

13. An RC circuit, to behave as a true differentiator for a symmetric square waveform of KHz at the input should have a time constant of not greater than ----------------.

    (a) 50 μs   (b) 1 ms   (c) 20 ms   (d) 5 μs

14. The multivibrator circuit that has a typical application of converting sinusoidal inpt into a square wave output is
    (a) Emitter coupled binary
    (b) Monostable multivibrator
    (c) Astable multivibrator
    (d) Schmitt Trigger

15. When a sinusoidal waveform with a peak amplitude of 10V is fed to the clamping circuit of figure1, _____ of the waveform will be clamped to -0.7V. Assume practical silicon diode.
    (a) Positive peak
    (b) Positive peak with a DC shift of 0.7V
    (c) Negative peak
    (d) Negative peak with a DC shift of 0.7V
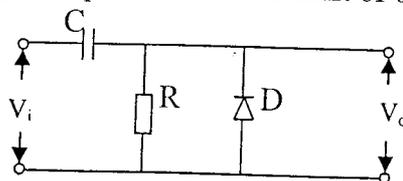

Figure 1

16. An UJT relaxation oscillator circuit produces a sawtooth like waveform
    (a) At B1 Terminal
    (b) At B2 Terminal
    (c) Across the Capacitor
    (d) Across the Resistor

17. A full-wave rectifier when connected to the secondary of a mains transformer produces a no load DC voltage of 12V. The peak value of the voltage across transformer secondary is
    (a) 3.8V   (b) 18.84V   (c) 8.49V   (d) 16.97V

18. The output voltage at no load in an unregulated power supply is the same as its output voltage at rated load current. Its internal resistance is therefore,
    (a) Extremely small
    (b) zero
    (c) Extremely large
    (d) Infinite

19. Percentage regulation of a regulated power supply is given by
    (a) $\dfrac{V_{noload} - V_{full-load}}{V_{full-load}} \times 100$

    (b) $\dfrac{V_{noload} - V_{full-load}}{V_{noload}} \times 100$

    (c) $\dfrac{V_{full-load} - V_{noload}}{V_{full-load}} \times 100$

    (d) $\dfrac{V_{full-load}}{V_{noload}} \times 100$

20. Which components' size is affected by the frequency of operation of a switched mode power supply?
    (a) Transformer
    (b) Transistor and Transformer
    (c) Transformer and Capacitor
    (d) Capacitor

PART B (5 x 16 = 80 Marks)

21. (a) (i) Describe the operation and characteristics of a CE amplifier.   (8)

    (ii) Determine the input and output impedances and midband gain of the CE transistor amplifier.   (8)

(OR)

21. (b) (i) Compare the performance of class A amplifier with resistive load and transformer coupled load.   (8)

    (ii) Derive the expression for the efficiency of class B power amplifier.   (8)

22. (a) (i) Explain the operation of a differential amplifier with circuit diagram. (10)

(ii) Derive CMRR for a differential amplifier. (6)

(OR)

22. (b) Draw and explain the circuit diagram of a single tuned capacitively coupled amplifier. Sketch its frequency response and explain.

23. (a) (i) Bring out the advantages of using negative feedback in amplifier. (4)

(ii) What is the effect of a voltage series negative feedback on input impedance, output impedance, distortion and gain of a BJT amplifier. (12)

(OR)

23. (b) Draw and explain the circuit diagram for a Wien bridge oscillator. Derive the necessary conditions to be met for sustained oscillation and discuss about its stability.

24. (a) What is a Monostable Multivibrator. Explain its working with the help of waveforms.

(OR)

24. (b) (i) Explain with necessary circuit diagram and waveforms the operation of positive and negative clipper circuits. (8)

(ii) Explain the working principle of UJT relaxation oscillator. (8)

25. (a) (i) Derive the expression for ripple factor of an LC filter. (8)

(ii) Compare switch mode power supplies and linear voltage regulators. (8)

(OR)

25. (b) (i) Explain the working of full wave bridge rectifier with waveforms. (8)

(ii) Determine the TUF and efficiency of the above rectifier. (8)

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