

## Part - A

1. The power rating of a BJT is determined by which of the following
    - a. Width of the base
    - b. Heat sink
    - c. Collector base area
    - d. Base emitter junction area
  2. Which of the following correctly determines the relation between  $\alpha$  and  $\beta$ ?
    - a)  $\beta = \alpha / (1 - \alpha)$
    - b)  $\alpha = \beta / (1 - \alpha)$
    - c)  $\beta = \alpha / (1 - \beta)$
    - d)  $\beta = \alpha * (1 - \beta)$
  3. \_\_\_\_\_ region of the transistor is highly doped?
    - a. Base
    - b. Collector
    - c. Both Base and Collector
    - d. Emitter
  4. For common emitter configuration, which of the following is the correct relation?
    - a)  $I_C < I_E$
    - b)  $I_C = \beta I_B$
    - c)  $I_C = \alpha I_E$
    - d)  $I_C = I_E$
  5. In a BJT
    - A. The collector is sandwiched between base and emitter
    - B. The base region is sandwiched between emitter and collector
    - C. The emitter region is sandwiched between base and collector
    - D. the collector is sandwiched between neutral and poles
  6. The determination of JFET characteristics necessitates \_\_\_\_\_
    - A. One voltmeter at the output side and ammeters at both sides
    - B. Ammeter only at the output side and voltmeter only at the input side
    - C. A voltmeter at the output side and an ammeter at the input side
    - D. One ammeter at the output side and voltmeters at both sides
- ANSWER: D
7. JFET is a \_\_\_\_\_ controlled device, which has \_\_\_\_\_.
    - A. Current, high input impedance

- B. Voltage, low input impedance
- C. Current, high noise level
- D. Voltage, high input impedance

ANSWER: D

8. The transfer characteristic for a JFET is drawn between \_\_\_\_\_ and \_\_\_\_\_ current.

- A. Input voltage and input current
- B. Output voltage and input current
- C. Input voltage and output current
- D. Output voltage and output current

ANSWER: C

9. Which of the following applications, is more suitable for a common gate JFET configuration?

- A. Audio frequency amplifiers
- B. High input impedance pre-amplifier stages
- C. Voltage buffer applications
- D. Microphone amplifiers

ANSWER: D

10. The expression of drain current in CS JFET amplifier is

- A.  $I_D = I_{DSS} * (1 - (V_{DS}/V_P))^2$
- B.  $I_D = I_{DSS} * (1 - (V_{GS}/V_P))^2$
- C.  $I_D = I_{DSS} * (1 - (V_P/V_{GS}))^2$
- D.  $I_D = I_{DSS} * (1 - (V_P/V_{DS}))^2$

ANSWER: B

11. Which of the following statements are true based on relative comparison between BJT and JFET?

- (1) JFET has high noise level and better thermal stability
- (2) Both types of carriers conduct current in JFET
- A. (1) alone is true
- B. (2) alone is true
- C. Both (1) and (2) are true
- D. Neither (1) nor (2)

ANSWER: D

12. Transistor works as an amplifier when

- a. **Input junction is forward biased and the output junction is reverse biased**

- b. Input junction is reverse biased and the output junction is forward biased
- c. Both input and output junction is forward biased
- d. Both input and output junction is reverse biased

13. Voltage amplification in the common base is always

- a. less than 1**
- b. greater than 1
- c. less than 0
- d. between 1 to 5

14. In CE amplifier the input and output current is

- a.  $I_B$  and  $I_C$**
- b.  $I_B$  and  $I_E$
- c.  $I_E$  and  $I_C$
- d.  $I_E$  and  $I_C$

15. An ideal amplifier has

- a. the noise figure of less than 1 dB
- b. noise factor of unity**
- c. output S/N more than input S/N
- d. the noise figure of more than 0 dB.

16. The purpose of the Capacitor connected to the input and output side of the amplifier circuit is

- a. Remove DC component**
- b. Increase input gain
- c. Increase output gain
- d. Remove AC component

17. The phase difference between the output and input voltages of a CE amplifier is

- a.  $180^\circ$**
- b.  $0^\circ$
- c.  $90^\circ$
- d.  $270^\circ$

18. \_\_\_\_\_ always operates at linear region at all times

- a. Class B amplifiers
- b. Class A amplifiers
- c. Class AB amplifiers
- d. Class C amplifiers

Ans. B.

19. Which amplifier is designed to handle AC signals?

- a. Small signal amplifiers
- b. Large signal amplifiers
- c. Thin signal amplifiers
- d. Band signal amplifiers

Ans. A.

20. An amplifier which gives a theoretical efficiency of 70 to 80 % efficiency is

- a. Class B amplifiers
- b. Class A amplifiers
- c. Class AB amplifiers
- d. Class C amplifiers

Ans. A

21. Which factor determines the maximum power rating of a transistor?

- a. Maximum collector voltage
- b. Maximum collector current
- c. Temperature of the base to collector junction
- d. Temperature of the base to emitter junction

Ans. C

22. Transistor is a \_\_\_\_\_ in power amplifier.

- a. Active device
- b. Passive device
- c. Op- amp
- d. Voltage generating device

Ans. A

23. In power amplifier output power rating will be \_\_\_\_\_ if the output impedance is halved.

- a. Halved
- b. Squared
- c. Doubled
- d. Square rooted

Ans. B

24. Operational amplifier in open-loop configuration in ideal case has voltage gain

- (a) Very large

- (b) Infinite voltage gain
- (c) Finite gain
- (d) Finite current gain

Answer: b

25..The feedback path in an ideal op-amp integrator consists of a

- (a) resistor
- (b) capacitor
- (c) resistor and a capacitor in series
- (d) resonant circuit

Answer: b

26..Unity gain and zero phase shift around the feedback loop are conditions that describe

- (a) an active filter
- (b) a comparator
- (c) an oscillator
- (d) an integrator or differentiator

Answer: c

27.The input frequency of a single-pole, low-pass active filter increases from 1.5 kHz to 150 kHz. If the critical frequency is 1.5 kHz, the gain decreases by

- (a) 3 dB
- (b) 20 dB
- (c) 40 dB
- (d) 60 dB

Answer: c

28. The characteristic that allows an isolation amplifier to amplify small signal voltages in the presence of much greater noise voltages is its

- (a) CMRR
- (b) high gain
- (c) high input impedance
- (d) magnetic coupling between input and output

Answer: a

29.The output waveform of an op amp integrator circuit with square-wave input signal is

- (a) Triangular waveform
- (b) Ramp
- (c) Saw-tooth wave

(d) Spikes

[Ans. (a)]

30. An op amp circuit that produces an output voltage, which is the sum of its input voltages

(a) Summing amplifier

(b) Integrator

(c) Differentiator

(d) Multiplier

[Ans. (a)]

31. Output of a Schmitt Trigger circuit is a square wave when its input signal is

(a) Ramp voltage

(b) Sine wave

(c) Square wave

(d) Triangular wave

[Ans. (b)]

32. The other name of voltage follower is

(a) differential amplifier

(b) inverting amplifier

(c) non-inverting amplifier

(d) unity-gain amplifier

Answer: d

33. The function of the feedback sampler in the feedback system is

A. mixing the feedback signal with the primary input signal

B. taping the output signal for feedback

C. to provide the feedback network gain  $\beta$

D. to provide the amplifier gain A

Answer: B

34. Which of the following statement is not correct Negative feedback is obtained based on the sign of

A. Negative feedback is obtained based on the sign of mixer

B. Negative feedback is obtained based on the sign of input signal

C. Negative feedback is obtained based on the sign of feedback network gain  $\beta$

D. Negative feedback is obtained based on the sign of amplifier gain A

Answer: B

35. Desensitivity factor of the negative feedback system is

- A.  $(-A\beta)$
- B.  $(1+A\beta)$
- C. feedback network gain  $\beta$
- D. amplifier gain A

Answer: B

36. In voltage series feedback amplifier the voltage gain is stabilized to

- A.  $(1/\beta)$
- B.  $(1+A\beta)$
- C. feedback network gain  $\beta$
- D. amplifier gain A

Answer: A

37. In current shunt feedback system the input resistance with feedback

- A. increases
- B. remain the same
- C. decreases
- D. become zero

Answer: C

38. \_\_\_\_\_ oscillations are produced by oscillators

- A. Undamped
- B. Damped
- C. Overdamped
- D. Modulated

Answer: A

39. \_\_\_\_\_ feedback is found in oscillators.

- A. Positive
- B. Negative
- C. Current
- D. Voltage

Answer : A.

40. The temperature coefficient of crystal is \_\_\_\_\_ when the crystal frequency changes due to change in temperature.

- A. -4
- B. 0
- C. 1

D. 4

Answer: C

41. The comparators in the 555 timer circuit \_\_\_\_\_

- A. compares the output voltages to the internal voltage divider
- B. compares the output voltages to the external voltage divider
- C. compares the input voltages to the external voltage divider
- D. compares the input voltages to the internal voltage divider

Answer: D

42. In 555 timer circuit, the \_\_\_\_\_ pin is the reset pin.

- A. 3
- B. 2
- C. 4
- D. 1

Answer: C

43. For a BJT, for common base configuration the input characteristics is represented by a plot between which of the following parameters?

- a)  $V_{BE}$  and  $I_E$
- b)  $V_{BE}$  and  $I_B$
- c)  $V_{CE}$  and  $I_C$
- d)  $V_{CC}$  and  $I_C$

44. The drain current of common drain JFET amplifier will increase, when \_\_\_\_

- A.  $V_{DS}$  is increased beyond the pinch-off voltage, for a given input voltage
- B. The reverse bias voltage  $V_{GD}$  is increased
- C. The characteristic curve is under saturation or active region.
- D. The input voltage is less negative

ANSWER: D

45. In the common source JFET amplifier, when the gate to source voltage is increased from -3.2V to -4.6V, the drain characteristics will \_\_\_\_\_

- A. Shift up
- B. Shift down
- C. Maintain the pinch off voltage constant
- D. Decrease the width of depletion layers

ANSWER: B

46. In transistor as amplifier circuit  $V_{CE} = V_{CB} + \underline{\hspace{2cm}}$



- a.  $V_{BE}$
- b.  $2V_{BE}$
- c.  $1.5V_{BE}$
- d.  $V_{BE}/2$

47. The proper amplification of transistor in d.c load line located at

- a. The end
- b. Middle**
- c. Negative axis
- d. X axis

48. In common, base amplifier configuration, what should be the level of input?

- a. Low**
- b. High
- c. Moderate
- d. Stale

49. The voltage gain of the following transistor amplifier configuration is lowest

- 
- a. common collector**
  - b. common emitter
  - c. common base
  - d. common emitter & base

50. Which of the following amplifier cannot be used for audio frequency amplification?

- a. Class A
- b. Class C
- c. Class AB
- d. Class B push-pull

Ans. B

51. Why class C power amplifier is suitable for tuning circuits?

- a. Due to potential divider
- b. Filter circuit
- c. Audio amplifier
- d. Transformer

Ans. B

52. The problem in which output signal is not an exact reproduction of output signal in amplifier is collectively called

- a. Thermal runaway
- b. Phase error
- c. Distortion
- d. Biasing error

Ans. C

53 The inductance in the equivalent circuit of crystal oscillator represents \_\_\_\_\_

- a) Inter electrode capacitance
- b) Compliance
- c) Viscous factor
- d) Mass

54. A relaxation oscillator uses \_\_\_\_\_ for generating pulses.

- A. Diode
- B. Transistor
- C. Op amp
- D. UJT

Answer: D

55. The voltage across the capacitor varies between \_\_\_\_\_ in a 555 timer circuit.

- A. 4 V to 5V
- B. 4.5V to 6 V
- C. 3V to 6 V
- D. 5 V to 8 V

Answer: C

56. \_\_\_\_\_ waveforms are generated in UJT relaxation oscillator.

- A. Spikes
- B. Square
- C. Triangular
- D. Saw-tooth

Answer : A

57. The following, \_\_\_\_\_ is not an application of 555 timer.

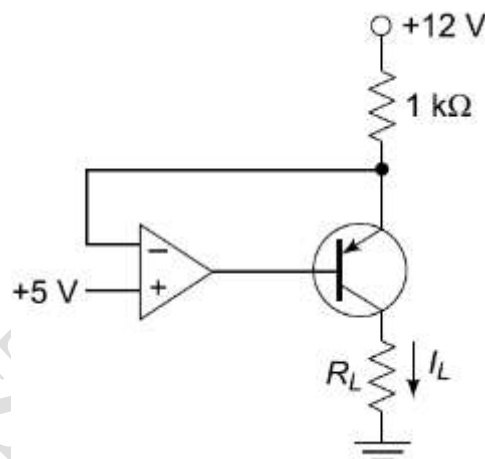
- A. Sinusoidal
- B. Single pulse generation
- C. Generating train of pulses

D. Pulse code detection

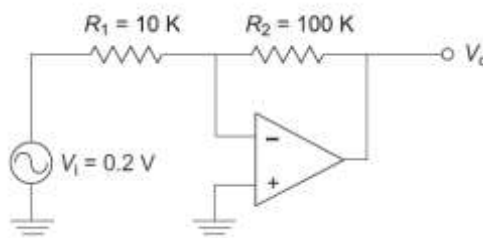
Answer: A

**Part B (2 Marks)**

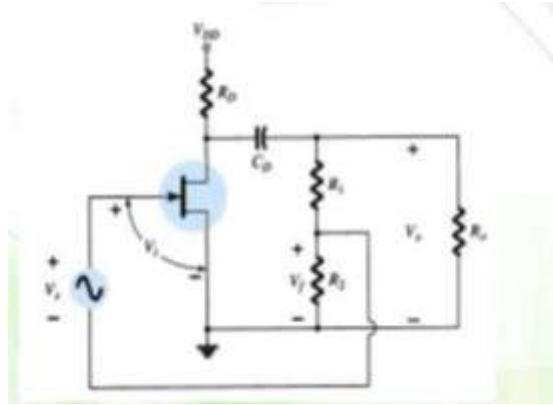
1. What is the essential possible condition of biasing, for a transistor to operate in an active region?
2. What would be efficiency of a Class A Power amplifier when it has collector voltage of 20 V and collector current of 2 amps?
3. Assume that an op-amp 741 connected as a unit gain inverting amplifier is applied with an input change of 10 V. Determine the time taken for the output to change by 10 V.
4. Consider an operational amplifier with resistors  $R_1 = 1 \text{ k}\Omega$  and  $R_f = 99 \text{ k}\Omega$ . When the two input terminals are grounded so that voltage  $V_1 = 0$  and  $V_2 = 0$ . Calculate the output offset voltage  $V_{\text{out}}(0)$ , if there is an input offset voltage  $V_{\text{in}}(0) = 2 \text{ mV}$ .
5. Determine the output current  $I_L$  for the circuit shown in Fig.



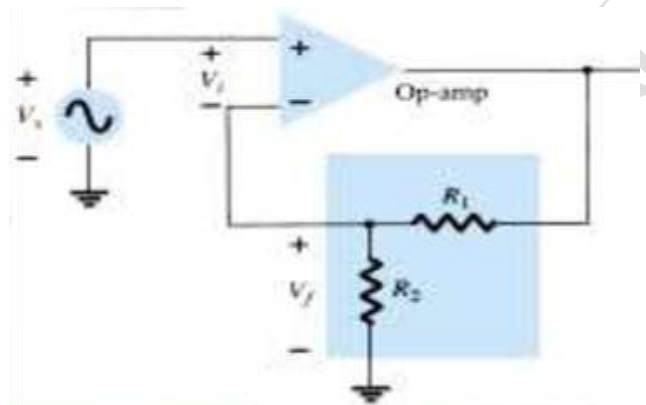
6. A  $\mu\text{A} 741\text{C}$  op-amp is used in the circuit, the output voltage for the ideal op-amp will be



7. Calculate the feedback network gain for the circuit given below with  $R_1 = 80\text{k}\Omega$ ,  $R_2 = 20\text{k}\Omega$ ,  $R_o = 10\text{k}\Omega$ ,  $R_D = 20\text{k}\Omega$  and  $g_m = 5000\mu\text{S}$ .

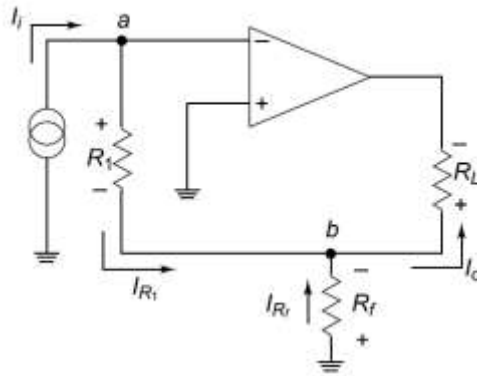


8. Calculate the op-amp gain with feedback for the circuit given below with op-amp gain  $A=100,000$  ,  $R_1=1.8\text{k}\Omega$  and  $R_2=200\Omega$ .



### Part C (3 Marks)

1. Explain the operation of NPN transistor.
2. Write short notes on static characteristics of junction transistor in CE configuration.
3. Compare the features of BJT and JFET
4. Explain common Emitter transistor as amplifier with neat circuit diagram
5. Explain cut off and saturation with suitable circuits.
6. How cross over distortion is eliminated in Class AB power amplifier?
7. Briefly explain on the amplifier which amplifies only one half cycle of the input signal?
8. Calculate the voltage gain of an inverting op amp with  $R_1 = 3.3 \text{ k}\Omega$  and resistor  $R_2 = 33 \text{ k}\Omega$ . Calculate the output voltage when the input voltage = 0.5 Calculate the total output offset voltage for input offset voltage = 0.05 V.
9. Assume that  $R_1 = 22 \text{ k}\Omega$ ,  $R_f = 1 \text{ k}\Omega$ ,  $R_L = 10 \text{ k}\Omega$  and  $I_i = 10 \mu\text{A}$  for the circuit shown in Fig. Determine the load gain



10. Calculate the voltage gain of non-inverting op amp if  $R_1 = 2.2 \text{ k}\Omega$  and resistor  $R_2 = 22 \text{ k}\Omega$ . Calculate output voltage for input voltage of 0.2 V. Calculate the total offset voltage due to input offset voltage of 0.02 V.
11. Explain current series voltage shunt feedback amplifier.
12. Explain UJT relaxation oscillator.
13. Explain internal operation of 555 timer.