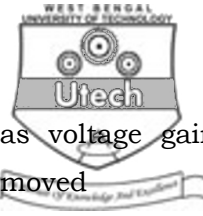


Invigilator's Signature :



- iii) 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.
- iv) In an amplifier, a coupling capacitor is used to
 - a) match the impedance
 - b) control frequency
 - c) limit the bandwidth
 - d) prevent *dc* mixing with the output.
- v) To avoid false triggering of the NE 555 timer, the RESET pin (Pin 4) is generally connected to
 - a) Pin 8
 - b) Pin 3
 - c) Pin 1
 - d) No Connection (NC).
- vi) The output pulse width for a monostable multivibrator using IC 555 where external resistance & capacitance are $20\text{ k}\Omega$ & $0.1\text{ }\mu\text{F}$ is
 - a) 2.1 s
 - b) 2 ms
 - c) 2.5 ms
 - d) $2.2\text{ }\mu\text{s}$.



- xii) A certain common-emitter amplifier has voltage gain 100. If the emitter bypass capacitor is removed
- a) circuit will become unstable
 - b) q -point will shift
 - c) voltage gain will increase
 - d) voltage gain will decrease.
- xiii) Negative feedback in amplifier
- a) increases both gain and bandwidth
 - b) increases gain and decreases bandwidth
 - c) increases bandwidth and decreases gain
 - d) decreases both gain and bandwidth.
- xiv) A push pull amplifier balances out
- a) odd harmonies
 - b) even harmonies
 - c) both odd and even harmonies
 - d) neither odd nor even harmonies.
- xv) An ideal Op-Amp has
- a) infinite common mode gain and zero differential gain
 - b) infinite common mode gain as well as differential gain
 - c) infinite differential gain and zero common mode gain
 - d) zero common mode gain as well as differential gain.



GROUP – B

(Short Answer Type Questions)

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

2. Derive the relationship between drain to source current (I_{ds}) and drain to source voltage (V_{ds}) for MOSFET. Find the MOS transconductance (g_m) and output conductance (g_{ds}).
3. Define the stability factor & thermal run away. Draw & explain the operation of transistor connected in CB mode.
4. Why is emitter resistance R_E in an emitter-coupled differential amplifier replaced by a constant current source ? Explain why the network replacing R_E acts as an constant current I_0 .
5. a) Draw the output waveforms if input of a differentiator is
 - i) Triangular wave
 - ii) Square wave.b) Obtain the expression for output voltage of an integrator using Op-Amp.
6. Write a note with related mathematical derivation of Op-Amp as an inverting & non-inverting amplifier. What is buffer ?

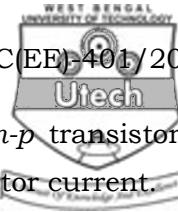


GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Draw and explain the functional diagram of 555 Timer. 6
- b) Draw the circuit and explain the operation of an Monostable multivibrator using a 555 Timer. 6
- c) In 555 Timer monostable multivibrator using $R = 100 \text{ k}\Omega$ and time delay = $100 \mu\text{s}$, calculate the value of C . 3
8. What is self-bias ? Draw the circuit diagram showing self-bias of a $n-p-n$ transistor in the CE configuration. Explain physically & mathematically how the self-biasing resistor improves the stability. Explain the function of bypass and coupling capacitors. $2 + 3 + 8 + 2$
9. a) What is Op-Amp ? State the characteristics of an ideal Op-Amp.
- b) Write a note with related mathematical derivation of Op-Amp as an integrator and differentiator.
- c) Write a brief note for logarithmic amplifier. $5 + 5 + 5$
10. a) What are the advantages of class C amplifier ? Mention its application.
- b) Draw a circuit of a class B push-pull power amplifier. Derive its maximum power efficiency and collector dissipation.
- c) Derive the maximum power efficiency of a class A amplifier. How can its efficiency be improve ? $4 + 6 + 5$



11. a) Draw the Eber's Moll model of the $p-n-p$ transistor & give the equation for the emitter & collector current.
- b) A given transistor with collector current 10 mA, collector to emitter volt 10 V and at room temperature has the following set of low frequency parameters :

$$h_{ie} = 500 \text{ ohm}, h_{oe} = 10^{-5} \text{ amp/V}, h_{re} = 10^{-4} .$$

Find the values of all the hybrid-II parameters of low frequency model.

- c) What are the early Effect ? 5 + 8 + 2

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