

B.Sc. Sem.-5 Examination

CC 301

Electronics

January 2021

Time : 2-00 Hours]

[Max. Marks : 50

- Instructions: (1) All questions in section-1 carry equal marks.
 (2) Attempt any THREE questions in Section-I.
 (3) Question-9 in section-II is compulsory.

Section-I

- Q-1 (A) Draw the circuit diagram of Emitter coupled differential amplifier along with its low frequency small signal equivalent circuit and derive the equation for closed loop voltage gain. (7)
 (B) Explain in detail the necessity of active load in differential amplifier. (7)
- Q-2 (A) Write a short note on basic BJT current mirror (7)
 (B) In the basic differential amplifier circuit, $R_C = 2 \text{ k}\Omega$; $R_E = 4.3 \text{ k}\Omega$, $V_{CC} = |V_{EE}| = 5 \text{ V}$; $\beta_0 = 200$, $V_{BE} = 0.7 \text{ V}$. Determine the values of quiescent currents and voltages I_{BQ} , I_{CQ} , V_{O1} , V_{O2} , V_{CEQ} for both inputs V_1 and V_2 grounded. (7)
- Q-3 (A) Discuss voltage to current converter (with grounded load) application using Op-Amp. Prove $i_L = v_i/R$. (7)
 (B) Explain with suitable diagram: Half-wave rectifier using Op-Amp. (7)
- Q-4 (A) Draw positive peak detector circuit using Op-Amp. Explain its working with suitable wave forms. (7)
 (B) Draw positive clipper circuit using Op-Amp. Explain its working with suitable wave forms. (7)
- Q-5 (A) Draw the block diagram of series IC voltage regulator. Explain voltage reference block using zener and how it is compensated by base-emitter diodes of transistors. (7)
 (B) Write a short note on 3-Terminal positive IC voltage regulator. (7)
- Q-6 (A) How thermal overload protection is obtained in IC voltage regulators? (7)
 (B) Discuss positive voltage regulator using IC $\mu\text{A} 723$ using fold-back current limiting circuit. (7)
- Q-7 (A) Explain operation of switching regulator using LM 105. (7)
 (B) Explain any two switching regulator circuit schemes with the help of block diagrams. (7)
- Q-8 (A) Briefly explain the control circuit consideration in buck switching regulator. (7)
 (B) Explain the operation of free running switching regulator. (7)

Section-II

- Q-9 Attempt any EIGHT (8)
 (A) In four stages of Op-Amp, first two stages are cascaded differential amplifiers are designed to provide _____ and _____.
 (B) Full form of CMRR is _____.

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- (C) The CMRR is measured in _____ unit.
 - (D) The output resistance of a good current source should be very _____.
 - (E) Scale changer circuit using Op-Amp is also known as _____.
 - (F) _____ circuit is known as transconductance amplifier.
 - (G) Where voltage to current converter circuit is used?
 - (H) The circuit known as _____ diode is capable of rectifying input signals of the order of millivolt.
 - (I) Write one advantage of IC voltage regulator over discrete component regulator.
 - (J) Which type of voltage reference is derived from the highly predictable voltage, current and temperature relationship in a base-emitter junction of an integrated transistor?
 - (K) What options are available in 78XX?
 - (L) A 4-terminal IC regulator is superior to the 3-terminal IC regulator. Give reason.
 - (M) What is the purpose of switching mode operation in switching regulators?
 - (N) Why the switching regulators are generally used in close proximity to the loads?
 - (O) What is the full form of RFI (that results due to switching process)?
 - (P) Draw the pin configuration of IC regulator LM 105.
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