

Sl. No. of Question Paper: 2291

Unique Paper Code: 2511203

Name of the Paper: Analog Devices

Name of the Department: Electronic Science

Semester: II

Name of the Course: B.Tech (Instrumentation)

Duration: 3 hours

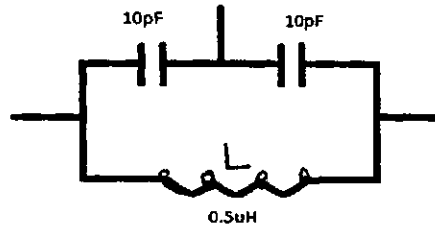
Maximum Marks: 75

F-4

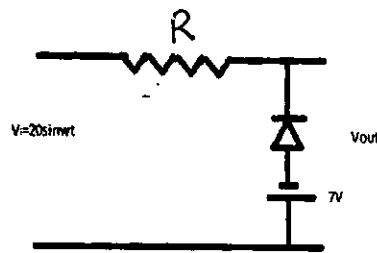
Instructions for candidates

- 1. Question number 1 is compulsory.**
- 2. Attempt five questions in all.**
- 3. Use of non-programmable scientific calculator is allowed.**

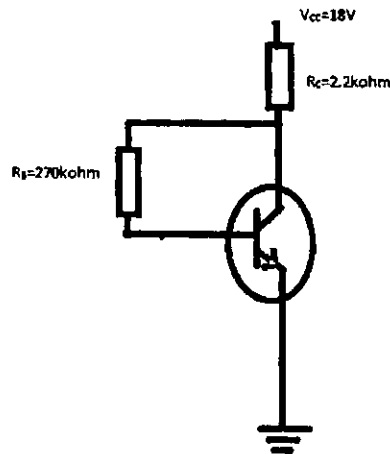
- Q.1 (a) A transistor has $I_C=2\text{mA}$ and $I_B=2.05\text{mA}$. Calculate the new current levels (3)
when the transistor is replaced with another transistor that has $\beta=65$. Assume
 I_B remains constant.
- (b) Define pinch-off voltage and transconductance of JFET (3)
- (c) Can Voltage amplifier work as a Power amplifier? Justify. (3)
- (d) Calculate the frequency of oscillation for the Colpitts oscillator having the (3)
tuned circuit as follows:



- (e) What is transformer utilization factor (TUF)? (3)
- Q.2 (a) Draw the circuit diagram of a Half Wave Rectifier and calculate (i) I_{dc} (ii) I_{rms} (9)
(iii) ripple factor (iv) efficiency of rectification.
- (b) Sketch the output waveforms for the circuits shown below: (3)



- (c) Draw the I-V Characteristics of an ideal diode. (3)
- Q.3 (a) Calculate the coordinates of Q point for the following circuit. Given $\beta=80$ (8)

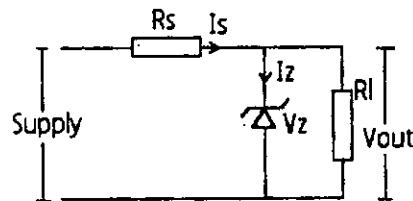


Does the above circuit provide stability against temperature and β variations? Explain.

- (b) Draw an equivalent circuit of common emitter configuration using h (5)
parameters. Calculate hybrid parameters with a.c. input open circuited

having $I_b=0$, $V_{be}=0.25\text{ mV}$, $I_c=30\text{ }\mu\text{A}$ and $V_{ce}=1\text{ V}$

- (c) Derive the relationship between input current and output current for CC configuration. (2)
- Q.4 (a) What type of feedback is required for sustained oscillations in an oscillator and why? Draw the circuit diagram of an RC phase shift oscillator and obtain an expression for its frequency of oscillation. (8)
- (b) Explain the working of class-B power amplifier. (5)
- (c) What is piezoelectric effect? (2)
- Q.5 (a) Explain the working of uni-junction transistor (UJT). Draw its IV characteristics. (6)
- (b) Derive the expression for cut off frequency for CE amplifier in low frequency region. (6)
- (c) For a JFET, calculate the value of drain resistance (r_d), transconductance (g_m) and amplification factor (μ) if $V_{ds1}=10\text{ V}$, $V_{ds2}=60\text{ V}$, $I_{d1}=5\text{ mA}$, $I_{d2}=5.5\text{ mA}$, $V_{gs1}=2\text{ V}$ and $V_{gs2}=3\text{ V}$ (3)
- Q.6 (a) Explain the formation of accumulation, depletion and inversion regions in MOSFET. (7)
- (b) Over what range of input voltage will the zener circuit shown in figure maintain 30 V across 2 K Ω load assuming that series resistance $R_s = 200\text{ }\Omega$ and Zener current rating is 25 mA. (5)



- (c) Draw ac load line for CE amplifier. Briefly explain the significance of dc and ac loadline. (3)
- Q.7 (a) Draw the circuit for push pull amplifier and show that ac power developed across the load resistance is free from even harmonics (8)
- (b) Draw the input and output characteristics for CE transistor configuration. (4)
- (c) Explain the formation of space charge region in p-n junction. (3)