प्रज्ञानं ब्रह्म

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INTERNATIONAL CENTRE FOR APPLIED SCIENCES
(Manipal University)
IV SEMESTER B.S. DEGREE EXAMINATION –MAY 2016
SUBJECT: ELECTRONIC DEVICES AND COMPUTER INTERFACING (CS 241)
(OLD SCHEME)
20TH MAY, 2016

Time: 3 Hours   **Max. Marks: 100**

- ✓ **Answer ANY FIVE Questions.**
- ✓ **Missing data, if any, may be suitably assumed.**

1A. Explain with a neat circuit diagram, the RC coupled amplifier. Along with the waveform illustrate why output waveform is 180^0 out of phase. Also explain its frequency response.

1B. Using multiple Op-Amps design a circuit to get output voltage given by following expressions

$$v_o = 3v_1 - 1.5v_2 + 5.6v_3 - 1.4v_4$$
$$v_o = 3.5v_1 - 0.6v_2 + 2v_3$$

1C. Explain with the help of energy band diagram, the properties of materials.

(10+6+4=20)

2A. A Zener regulator has R_S=470Ω V_{in}=25V, V_Z=10V, P_{Zmax}= 300mW.
  (a). Determine V_L, I_L, I_Z and I_R if R_L=100Ω
  (b). Repeat (a) if R_L=1kΩ.
  (c). Determine the value of R_L that will establish maximum power condition for the Zener diode.
  (d). Determine the minimum value of R_L to ensure that the Zener diode is in the "on" state.

2B. Explain the working of full-wave center-tapped rectifier with the circuit diagram and waveforms. Derive the expressions for efficiency and ripple factor along with its average and rms voltage derivations.

2C. Explain the block diagram of an Op-Amp.

(10+6+4=20)

3A. Mention the criteria for sustained oscillation. With the help of neat circuit diagram, explain the working of RC phase shift oscillator. Design the phase shift oscillator so that f_0=500Hz.

3B. Given a triangular wave of peak voltage 8 volts and frequency 1KHz, design a circuit to clamp the signal to a level +2.5V from ground.

3C. Draw and explain the circuit of a square wave generator using an Op-Amp.

(10+5+5=20)

4A. Explain the structure of enhancement type MOSFET and its V-I characteristics.

4B. Derive the expression for the output of a difference amplifier using µA741. Design an Op-Amp subtractor to have output given by $v_o = \frac{3}{4}v_1 - \frac{5}{3}v_2$

4C. Explain with the circuit diagram, the application of transistor as a switch.

(10+6+4=20)

5A. An AC voltage of 230V, 50Hz is applied to transformer having turns ratio 15:1. The secondary of transformer is connected to half wave rectifier and a load resistance of 1KΩ. Determine average and rms values of output current and voltage, efficiency and ripple factor. What should be the PIV rating of the diode?

5B. Explain the input & output V-I Characteristics of transistor in common-emitter configuration. What is the significance of transistor in common-emitter configuration?

5C. Explain the working of binary weighted four bit DAC with the help of appropriate example.

(10+6+4=20)

6A. Explain the self-bias circuit and determine the expressions for the operating point. Perform the load line analysis and show how Q point varies with variations in V_{CC}, I_B and R_C.

6B. Explain the principle of operation of crystal oscillator. Also explain the circuit of crystal oscillator.

6C. Given a signal $10\sin(2\pi ft)$. Design a circuit to clip the signal above 2 volts.

(10+6+4=20)

7A. Explain the internal block diagram of 555 Timer. Explain its working as a monostable multivibrator. Design an astable multivibrator to generate a square wave of frequency of 1KHz and duty cycle 50%.

7B. A Si diode has reverse sat current 15 nA at 27°C. (a) Find the diode current when it is forward biased by 0.7 V. (b) Find the diode current when the temperature rises to 120°C. (c) Derive and determine dynamic and static resistances in both the cases.

7C. Explain the structure and V-I characteristics of photo diode.

(10+6+4=20)

8. Write short notes on following
   A. TRIAC
   B. Solar cells
   C. LED
   D. Varactor Diode

(4X5=20)