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PRANVEER SINGH INSTITUTE OF TECHNOLOGY, KANPUR

Pre-University

Session 2023-24

Odd Semester

B. Tech.- I Semester

Fundamentals of Electronics Engineering (BEC-101)

CO Number	Course Outcome
CO1	Define the various terminologies of semiconductor devices, communication systems, Boolean algebra and number systems.
CO2	Discuss the working of different semiconductor devices, communication systems and logic gates.
CO3	Apply the concepts of semiconductor devices, communication systems and logic gates to solve electronic circuit problems, communication system problems and illustrating Boolean function implementation with various logic gates, respectively.
CO4	Analyze the various semiconductor devices, communication systems and Boolean Function reduction methods.

Time: 3 Hrs. M. M. 70

Section A

Q1. Attempt all questions: **(2X7 = 14 Marks)**

a) Draw the VI characteristics of an ideal diode in forward and in reverse bias conditions. CO1

b) What is doping in semiconductor? Why it is required? CO1

c) Discuss the difference between BJT & JFET. CO2

d) Calculate β and I_{CBO} if $I_E = 6mA$, $I_C = 5.92$ mA and $I_{CEO} = 200mA$. CO3

e) What do you mean by CMRR? CO1

f) Determine base of the following: (i) $(345)_{10} = (531)_x$ (ii) $(211)_x = (152)_8$ CO1

g) Calculate the transmission efficiency if the modulation factor is 0.5. CO4

Section B

Q2. Attempt all questions: **(7X3 = 21 Marks)**

a) Explain the construction, working & characteristics of n-channel depletion type MOSFET. CO2

b i) Explain the working of Full wave bridge rectifier with circuit diagram. Find the average value of output voltage & current, Rectification Efficiency, Ripple Factor. CO2

OR

ii) Explain the working and circuit diagram of Op-amp as Integrator and Differentiator. CO2

c i) Perform following operation as indicated CO1

i) Determine 2's and 1's complement of $(101010.110)_2$

ii) Subtract using 10's complement $(9754)_{10} - (364)_{10}$

iii) Subtract using 1's complement $(10110)_2 - (110010)_2$

iv) Convert $(534)_8 = (\ )_{10}$

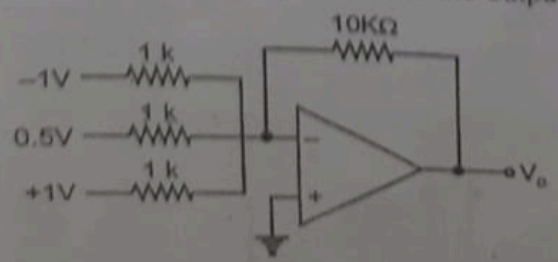
OR

ii) Writ short notes on i) Light Emitting Diode ii) Tunnel Diode CO1

Section C

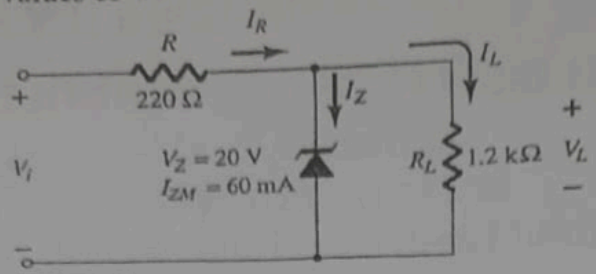
Q3. Attempt any one part of the following questions: **(7X1 = 7 Marks)**

a) List the characteristics of an idea op-amp. Calculate the output voltage of the circuit CO3



OR

b) Calculate the range of values of Vi that will maintain the Zener diode in ON state. CO3



Q4. Attempt any one part of the following questions: **(7X1 = 7 Marks)**

a) Explain the voltage doubler circuit in detail. CO2

OR

b) Explain the input, output characteristics of common emitter configuration in detail. Why common emitter configuration is most widely used configuration? CO2

Q5. Attempt any one part of the following questions: **(7X1 = 7 Marks)**

a) An audio frequency signal $5\text{Sin}(2\pi\times500t)$ is used amplitude modulate a carrier of $25\text{Sin}(2\pi\times10^5t)$. Calculate CO4

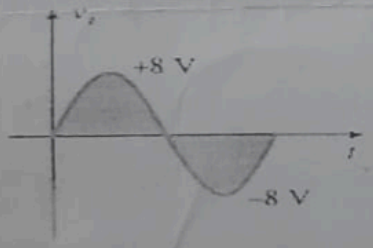
i) Modulation Index
ii) Sideband amplitude
iii) Sideband frequencies
iv) Bandwidth
v) Transmission Efficiency
vi) Total Power delivered to a load of 2KΩ load resistor

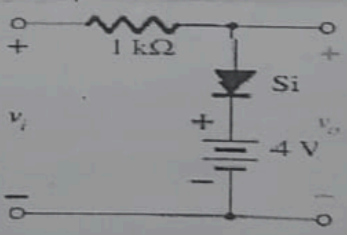
OR

b) Reduce the logic expression using K-map and implement the reduced expression using NAND Gates only $F = \sum m\,(0,1,2,4,7,8,12,14,15,16,17,18,20,24,28,30,31)$ CO4

Q6. Attempt any one part of the following questions: **(7X1 = 7 Marks)**

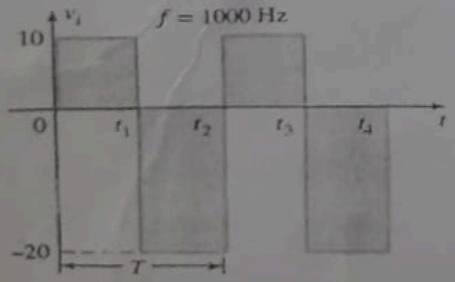
a) Determine v_o for given network and draw the output voltage waveform CO3

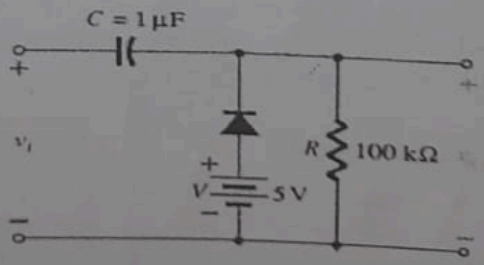




OR

b) Determine output voltage and draw the output voltage waveform CO3





Q7. Attempt any one part of the following questions: **(7X1 = 7 Marks)**

a) What do you mean by amplitude modulation? Explain with proper waveform. An AM radio transmitter radiates 6 KW power when modulation percentage is 70%. Find carrier power. CO2

OR

b) Explain the block diagram of wireless communication system. CO2