,CARMEL COLLEGE OF ARTS, SCIENCE & COMMERCE FOR WOMwEN, NUVEM-GOA
SEMESTER END EXAMINATION, JANUARY 2022

Semester: *V* **Course name & Code:** *Analog and Digital Electronics UPYC 106*

Total marks: *80* **Date:** */01/2022* **Duration:** *2 Hours* **Total No of pages: 3**

Instructions:

1) *All questions are compulsory, however internal choice is available.*
2) *Figures to the right indicate maximum marks to the question.*
3) *Symbols have their usual meanings unless otherwise stated.*
4) *Draw neat circuit diagram wherever necessary.*
5) *Use of non-programmable calculator is permitted.*

Q1. Answer **any Four** of the following. (4 x 4 = 16)

A) State the use of the following circuits a) astable multivibrator. b) monostable multivibrator c) bistable multivibrator d) Schmitt trigger.

B) State any two advantages of a FET over a conventional transistor. Give the working principle of CRD (current regulating diode).

C) State any four characteristics of an ideal op-amp. Draw the ideal voltage transfer curve of an op-amp.

D) What is meant by the terms LSB, MSB, fan in and fan out.

E) Draw a functional circuit diagram of IC 555 timer. State the function of each basic block of the timer.

F) Simplify the logic equations:
a) $ABC + A\overline{B}C + AB\overline{C}$.
b) $(A + B)(\overline{A} + B)$

Q2. Answer **any Four** of the following. (4 x 4 = 16)

A) For a transistor to be working in saturation region, obtain an expression for the minimum value of transistor h_{fe}.

B) Explain the following terms with respect to FET i) Transconductance. ii) Pinch off voltage.

C) What is meant by comparator and window comparator? Draw the circuit diagram of window comparator using two op-amp.

D) Classify the registers upon the way the data is entered or retrieved. What are Binary ripple counter and UP-DOWN counter?

E) Convert the decimal number 116 to binary number and binary number to decimal number.

F) Write Boolean equations in two different forms for Ex-OR gate. Draw logic circuits for each of them.

Q3. A) Explain the operation of FET as Voltage variable resistance, With the help of circuit diagram describe the application of FET as voltage variable resistance in voltage controlled attenuator. 6

OR

A) Draw the circuit of FET amplifier with common source. Draw its equivalent circuit at low frequencies. Write the expression for its voltage gain and its input resistance. 6

B) Draw a neat circuit and output waveform diagram of a transistorized astable multivibrator. Derive expression for the period of oscillations. 6

Q4. A) With the help of circuit diagram and waveform explain the working of op-amp triangular wave generator using Schmitt trigger and integrator. 6

OR

A) Draw the circuit diagram of a pulse generator using op-amp. Derive the expression for the pulse width. 6

B) Draw the functional block diagram of astable multivibrator using IC 555 timer. Obtain expression for its period of oscillations and duty cycle. 6

Q5. A) Draw the truth table for half adder. Realise the circuit using NAND gates only. 6

OR

A) Given three inputs, the truth table has a high output for the inputs (000), (011) and (111). Write product of sum equation and draw product of sum equation logic diagram. 6

B) Draw the circuit diagram of a two input Standard TTL NAND gate and explain its operation. 6

Q6. A) Draw the truth table and logical diagram for clocked RS flip flop and JK flip flop. Show how to convert a clocked RS flip flop into JK flip flop. 6

OR

A) Discuss 3 bit shift right register with logical diagram and waveforms. 6

B) Design a mod 5 counter using 3 JK flip-flop. Give the output wave form at each stage. 6