Roll No:

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M. Sc 3rd SEMESTER REGULAR EXAMINATIONS, NOV/DEC 2019-20
Subject code: CEC-PHY-302
Subject: Electronics

Time: 3 Hours   Max Marks: 80

The figures in the right hand margin indicate marks.

SECTION A

Q.1 Answer any four of the following: [4 X4 =16]

a   What is the expression for voltage gain in common source npn JFET amplifier?

b   Write brief notes on MOSFET.

c   Explain the following things of an operational amplifier.
       a. Input bias current
       b. Input offset current
       c. Base current
       d. Input offset voltage

d   What do you mean by CMMR?

e   Find out the expression for the output voltage of a summing circuit having inputs given to both inverting and non inverting ends. Assume two resistors are connected on each input.

f   What is the logic circuit whose Boolean equation is $Y = \bar{A}BC + A\bar{B}C$?

Or

2. Answer all questions from the following   [8×2 =16]

a   If the DC emitter current of a npn transistor is 0.83 mA, then what is the value of ac resistance of the emitter diode?

b   What are the advantages of hybrid parameter?

c   In a phase shift oscillator the value of R = R$_L$ is 4.7kΩ and capacitance C = 0.01μF. Determine the frequency of oscillator.

d   How to use an operational amplifier as a unit gain buffer circuit?

e   Construct an integrator and a differentiator circuit using operational amplifier.

f   Construct an XOR gate and write the truth table for the same.

g   What are the output voltages caused by each bit in a 5-bit ladder if the input levels are 0 = 0 V and 1 = + 10 V?

h   Find the binary equivalent weight of each bit in a 4-bit system.

SECTION-B

3. Answer all Questions: [4 ×16 =64]

| a | Draw the drain characteristic curve and transconductance curve for a neatly drawn npn JFET and explain the different regions of the drain characteristic curve. | 16 |

OR

| b | What are the four different types of biasing methods followed in the active region of a npn JFET? Explain each of them in detail. | 16 |

4.

| a | Find out the voltage gain expression of a differential amplifier by using non inverting input and single-ended output using a neat circuit diagram. What is the expression of input impedance in the same circuit? | 16 |

OR

| b | Find out the expression of gain, input impedance, bandwidth for an inverting and a non inverting negative feedback operational amplifier without using any approximation. | 16 |

5.

| a | Draw the circuit diagram of Wien bridge oscillator with a neat circuit diagram and explain how it generates a large range of frequencies. | 16 |

OR

| b | How to construct a quartz crystal oscillator? Explain various important physical properties of the crystal to achieve a better oscillator. Draw ac equivalent circuit of a vibrating crystal and find out the resonant frequency of the circuit. | 16 |

6.

| a | Construct NOT, OR, AND gates by using the universal gates. Write the corresponding truth table for them. Explain De Morgan's theorem. | 16 |

OR

| b | Explain the principle of conversion of analog signal to digital signal by using binary ladder method. | 16 |