M.Sc. (Physics) (CBCS Pattern) Sem-I

PSCPHYT03 - Paper-III - Core-III : Electronics

P. Pages : 2 **GUG/W/22/11181**

Time : Three Hours * 3 8 0 8 * Max. Marks : 80

Notes : 1. All questions are compulsory.
2. All questions carry equal marks.

Either:

1. a) How Schottky diodes are constructed? Compare the characteristics of Schottky diode and p-n junction rectifier diode. **4+4**

b) What is biasing of a transistor? Discuss different methods of transistor biasing. **8**

OR

e) What is quantum mechanical tunnelling in tunnel diode? Explain they V-I characteristics of tunnel diode. **8**

f) Explain construction and working of n-channel JFET. **6**

g) Write a short note on Q-Point of a transistor. **2**

Either:

2. a) With a neat diagram explain the action of Colpitts Oscillator. **8**

b) Explain direct-coupled amplifier. What are the advantages and disadvantages of it? **8**

OR

e) What is a clipper? Describe: **8**
i) Positive Clipper ii) Biased Clipper iii) Combination Clipper

f) Explain the concept of voltage regulation. **8**
Explain with suitable circuit diagram working of Zener voltage regulator.

Either:

3. a) What is full adder? Give its truth table and draw the circuit of full adder using XOR gate. **8**

b) Describe the working JKMS ff with the help of logic diagram and draw the timing diagram for it. **8**

OR

e) What is a shift register? What are the various types of shift registers? Explain the working of SISO shift register. **8**

f) With the help of neat diagram explain the working of R-2R ladder network DAC. **6+2**
Calculate the output voltage V_{out} of R-2R ladder type DAC when the input is 1000.

Either:

4. a) i) Describe frequency modulation. **2**

ii) Derive formula for instantaneous value of FM voltage. **4**

iii) Calculate the modulation index for an FM signal in which the modulating frequency is 2 kHz and the maximum deviation is 10 kHz. **2**

b) Draw the schematic diagram of reflex klystron. **8**
Explain how bunching takes place in the klystron amplifier around the electron which passes the buncher cavity gap when the gap voltage is zero and becoming positive.

OR

e) i) Describe phase modulation. Explain difference between FM and PM. **4**

ii) 100 kw carrier is modulated with 2kHz audio signal. **4**
After modulation power in the carrier increases to 132 kw. Calculate modulation index.

f) Draw and explain transistor AM modulator circuit. **8**

5. All questions are compulsory.

a) What is a photodiode? How does photodiode work? **4**

b) Explain the working of two-input transistor AND gate. **4**

c) Explain the use of OPAMP as a non-inverting amplifier. **4**

d) Audio signal of frequency 200 Hz is used to modulate a carrier of 500 kHz. Calculate band width and side frequencies. **4**

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