(7 pages) **Reg. No. :** .....

Code No. : 5551 **Sub. Code : KPHM 13/ PPHM 13**

M.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2020.

First Semester

Physics

INTEGRATED ELECTRONICS

(For those who joined in July 2016 and afterwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. In an enhancement MOSFET the conductivity of the channel ————————

(a) Increases (b) Decreases

(c) Zero (d) None

2. Triac is an ———————— switch

(a) DC (b) AC

(c) Mechanical (d) None

3. The circuit responds only when the clock is transition between its two voltage states ————————

(a) Level triggering (b) Edge triggering

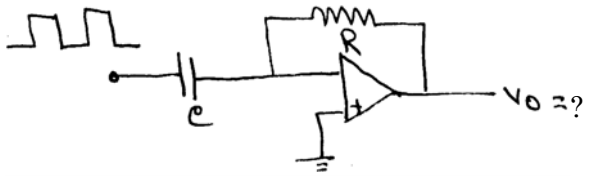
(c) RC triggering (d) None

4. ———————— flip flops are needed to store 4 bit binary number

(a) 2 (b) 4

(c) 3 (d) None

5. The expected output wave form of the following circuit is ————————



(a) Square wave (b) Sine wave

(c) Triangular wave (d) Spikes

6. ———————— filter circuit which passes low frequencies but stops high frequencies

(a) Low pass (b) High pass

(c) Band pass (d) None

7. The duty cycle is always number between ————————

(a) 0.0 and 0.5 (b) 0.0 and 1.0

(c) 0.0 and 1.5 (d) 0.0 and 2.0

8. Frequency shift keying is the ———————— modulation system in which digital information is transmitted through the discrete frequency change of carrier wave

(a) Amplitude

(b) Frequency

(c) Amplitude and frequency

(d) None

9. Shielding is only effective against electric fields if it provides a low ———————— path to ground

(a) Capacitative (b) Impedance

(c) Inductance (d) None

10. The electrical transducer converts the physical quantity into an ———————— signal

(a) Electric (b) Magnetic

(c) Optical (d) Electromagnetic

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Draw the circuit of an NAND DTL gates and explain its operation.

Or

(b) Explain the operation of JK master/slave flip-flop with neat circuit diagram and truth table.

12. (a) Explain the operation of depletion MOSFET with diagram.

Or

(b) Explain the construction and working of TRIAC.

13. (a) Sketch the sample and hold circuit and explain its operation.

Or

(b) Draw the circuit of an OP-amp integrator and explain its operation. Sketch the input and output waveforms.

14. (a) Draw the block diagram of IC 566 voltage controlled oscillator and explain its operation.

Or

(b) Discuss the application of PLL IC for frequency multiplication.

15. (a) Write short note on Box-car integrator.

Or

(b) Write working principle of lock in amplifiers.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) Define sheet resistance R_s. What is the order of magnitude R_s for the base region and also for the emitter region? Sketch the cross-section of IC resistor

(ii) Describe a thin film resistor.

Or

(b) Explain theory and working of junction field effect transistor.

17. (a) Explain the action of JK flip-flop with neat circuit diagram and truth table. Also explain how the racing problem is avoided.

Or

(b) (i) Write the advantages of a synchronous counter over a ripple counter.

(ii) Explain the construction and operation of a 4 bit ripple counter.

18. (a) Draw the circuit diagram of the instrumentation amplifier and explain its operation.

Or

(b) Solve the differential equation by analog computation.

$$\frac{d^2 V}{dt^2} + k_1 \frac{dv}{dt} + k_2 v - v_1 = 0 .$$

19. (a) Explain how IC 555 can be used as an astable multivibrator with circuit diagram. Also explain why astable multivibrator is called as free running multivibrator.

Or

(b) Explain the process of FSK demodulation using PLL.

20. (a) Explain the AC signal conditioning system with the help of the block diagram.

Or

(b) Define noise with reference to electrical system. Classify and explain the noise sources.

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