



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 3rd Semester Examination, 2022-23

PHSACOR07T-PHYSICS (CC7)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limits as practicable.
All symbols are of usual significance.*

Question No. 1 is compulsory and answer any two from the rest

1. Answer any *ten* questions from the following: 2×10 = 20
- (a) How can the phase difference between two AC voltages be measured by CRO?
 - (b) Differentiate between clipping and clamping circuits.
 - (c) What are the disadvantages of an S-R flip-flop?
 - (d) What is MOD-5 counter? What are the main functions of a register?
 - (e) Mention the advantage of MS-flip flop over JK flip-flop.
 - (f) Why combinational circuit is faster than sequential circuits?
 - (g) Draw the circuit diagram of NOT gate using transistor.
 - (h) What is ripple counter and parallel counter?
 - (i) Find the base n if $7_n \times 8_n = 38_n$.
 - (j) What do you mean by the passive component of an electronic circuit?
 - (k) Write down the truth table of a 2-input Ex-OR gate, why is it called a coincidence checker?
 - (l) What is meant by race-around condition in a flip-flop? How can it be avoided?
 - (m) Write the output of a comparator circuit.
 - (n) Draw a neat block diagram for a 4-bits ripple counter with S-R flip-flops.
 - (o) What is triggering? Write down the types of triggering.
2. (a) How the JK Flip-Flop can be used as the T Flip-Flop? Write its truth table. 2+1
- (b) Draw the logic diagram of 1-to-4 demultiplexer. How many select input is required for 1-to-16 demultiplexer? 3+1
- (c) Draw the circuit diagram of decade synchronous counter using JK flip-flop. 3
3. (a) What is a data register? Draw a 4-bit parallel in and parallel out shift register using D flip-flops. 1+3
- (b) Design a two input XOR gate using NOR gates only. 3

- (c) A 12 MHz square wave clocks a 6 bit ripple counter. What is the frequency of the last flip-flop? 2
- (d) Explain the difference between ROM and RAM. 1
4. (a) Expand $A(\bar{A} + B)(\bar{A} + B + \bar{C})$ to maxterms and minterms. 3
- (b) Design asynchronous mod-10 counter using JK flip-flop. Show the output. 3
- (c) When does an XOR gate give high output? 2
- (d) What is duality theorem in Boolean Algebra? Explain with an example. 2
5. (a) The calibration time base of a CRO is set at 2 ms/cm. The horizontal distance on the screen for one cycle of an a.c voltage applied to the vertical input is 2.5 cm. Find the frequency of the ac voltage. 3
- (b) Draw the Logic diagram of a 4-bit Full adder circuit using full adders only. 3
- (c) Write two applications of Flip-flops. 1
- (d) Design an astable multivibrator using 555 timer for a frequency of 1 kHz and duty cycle of 70%. 3