Roll No. .....

E–304

M. Sc. (First Semester)
EXAMINATION, Dec.-Jan., 2020-21

PHYSICS

Paper Fourth

(Electronics)

Time : Three Hours] [*Maximum Marks : 80*

Note : Attempt all Sections as directed.

Section—A 1 each

(Objective/Multiple Choice Questions)

Note : Attempt all questions.

Choose the correct answer :

1. Which one is not a characteristic of an ideal OPAMP ?
   (a) Bandwidth frequency is infinite
   (b) Voltage gain is zero
   (c) Input impedance is infinite
   (d) Output impedance is zero
2. At the Virtual Ground Point (VGP) of OPAMP :
   (a) Only potential difference between VGP and ground is nil

(b) Only impedance between VGP and ground is nil

(c) Both (a) and (b)

(d) None of these

3. One of the applications of OPAMP as a linear device is in :

(a) Comparator

(b) Waveform generator

(c) Schmidt trigger

(d) Integrator

4. Common mode rejection ratio of a good OPAMP is :

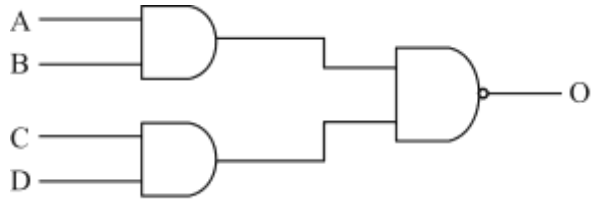
(a) Less than 1

(b) Equal to 1

(c) Very large

(d) Equal to the common mode gain

5. What is t he output of circuit shown in figure below ?



O =

(a) $\overline{ABCD}$

(b) $\overline{AB + CD}$

(c) $(\overline{A} + \overline{B})(\overline{C} + \overline{D})$

(d) None of these

6. The simplified form of logic expression :

$$A\overline{B} + AB + \overline{A}\,\overline{B} + AB$$

(a) A

(b) B

(c) AB

(d) 1

7. The ..... gate is used as a two-bit comparator.

(a) AND

(b) OR

(c) NAND

(d) EX-OR

8. The NAND and NOR gate are called the :

(a) Universal gates

(b) Basic gates

(c) Hexadecimal gates

(d) Decimal number gates

9. A sequential circuit consists of :

(a) Combinational logic only

(b) Memory element only

(c) Both (a) and (b)

(d) None of these

10. Flip flops are :

(a) Monostable elements

(b) Bistable elements

(c) Astable elements

(d) Tristable elements

11. Main building blocks of memory are :
    (a) Multiplexers
    (b) Decoders
    (c) Encoders
    (d) Registers

12. In a clocked SR flip flop, R is connected with S through an invertor, the circuit is also called :
    (a) JK flip flop
    (b) D flip flop
    (c) T flip flop
    (d) None of these

13. Which of the interrupts of μp 8085 has the highest priority ?
    (a) TRAP
    (b) INTR
    (c) RST 7.5
    (d) RST 6.5

14. How many flags are available with μp 8085 ?
    (a) 6
    (b) 5
    (c) 4
    (d) 3

15. The rotate operations are performed in ..... register.
    (a) Accumulator
    (b) B Register
    (c) SP registers
    (d) PC registers

16. Which of he following instructions is used to save the content of the accumulator in the stack ?

    (a) PUSH PSW

    (b) PUSH A

    (c) POP A

    (d) POP PSW

17. Which one of the given instructions is one-byte instruction ?

    (a) MVI A, 85H;

    (b) LHLD 2500H;

    (c) STAX B;

    (d) IN 29H;

18. If the μp 8085 adds two byte data : 87H and 79H—which flag(s) will be set (i.e. become(s) 1) :

    (a) Zero flag

    (b) Aux. carry flag

    (c) Carry flag

    (d) All of these

19. Which instruction sequence is equivalent to the XCHG instruction ?

    (a) PUSH H and POP D

    (b) PUSH D and POP H

    (c) PUSH H; PUSH D; POP H; POP D

    (d) None of these

20. The stack in memory is defined by initializing the ..... register.

    (a) Program Counter (PC)

    (b) Stack Pointer (SP)

    (c) Both PC and SP

    (d) None of PC and SP

Section—B 2 each

(Very Short Answer Type Questions)

Note : Attempt all questions.

1. What is an OP-AMP ? Why is it called so ?
2. Define the term Common Mode Rejection Ratio (CMRR) of an OPAMP.
3. Write the truth table of EXNOR gate.
4. What is race around condition in the JK flip flop ?
5. What do understand by Edge triggered flip flop ?
6. What is the function of program counter in the μp 8085 ?
7. What is a stack memory ? On what principle does it work ?
8. What is a counter ? How may flip flops are required to construct a decade counter ?

Section—C 3 each

(Short Answer Type Questions)

Note : Attempt all questions.

1. Convert a hexadecimal number $(8000)_{16}$ into a decimal number.

2. Determine the output voltage of an OPAMP for V_1 = 150 μV, V_2 = 140 μV. Differential gain A = 4000 and Common Mode Rejection Ratio (CMRR) P = 100.
3. Simplify the Boolean function :

$$Z = \overline{A}\,\overline{B}\,C + \overline{A}\,B\,\overline{C} + \overline{A}BC + A\,\overline{B}\,C + ABC$$

4. Realize a JK flip flop using SR flip flop and write its state equation.
5. Write four/five steps of PUSH operation which pushes contents of B and C registers into stack.
6. List down the types instructions of μp 8085 and explain each in one sentence.
7. Write down the content of register A, after executing the following program and explain :

   MVI A, 55 H;

   MVI B, 25 H;

   ADD B

   HLT

8. Compute as to how many times the loop in the following program in executed :

```
        LXI   D, 00 50H   ;
LOOP : DCX  D
       MOV   A, E         ;
       ORA   D            ;
       XRA     A          ;
       JNZ     LOOP       ;
       HLT
```

Section—D 5 each

(Long Answer Type Questions)

Note : Attempt all questions.

1. Derive the expression for close-loop gain of an OPAMP in non-inverting voltage feedback configuration.

   Or

   Give the truth table of an EXOR gate and highlight its various applications.

2. What are the universal gates ? Why are they named so ? Derive the basic gates (*i.e.*, AND, OR and NOT gates) from any *one* of universal gates.

   Or

   Draw the ckt of MS JK flip flop and explain its function.

3. Draw the block diagram of μp 8085 and explain the functions of various registers in general and the accumulator in special.

   Or

   What are the various flags available in 8085 ? Describe their roles and significances.

4. Write an Assembly Level Program (ALP) of μp 8085 along with its flowchart to add two one byte numbers already stored in addresses F800H and F801H. Store the result in the locations F802H and F803H.

   Or

   Write and assembly level program of μp 8085 along with its flow chart to multiply two one byte numbers already stored in addresses F800H and F801H. Store the results in the locations F802 and F803H.