

Seat No. _____

SUB: INSTRUMENTATION AND CONTROL ENGINEERING (IC)

Time:1 Hour 30 minutes

Instructions:

- 1. Ensure that all pages are printed.**
- 2. Use Black ball pen only**
- 3. Change in option is not allowed**
- 4. There is no negative marking**
- 5. Use of non-programmable scientific calculator is allowed**

- 1 Which of the following increases steady state accuracy
- | | |
|-----------------------|-------------------|
| A Derivative action | B Integral action |
| C Proportional action | D On off action |
- 2 What term describes the maximum expected error associated with a measurement or a sensor
- | | |
|------------|--------------|
| A Range | B Resolution |
| C Accuracy | D Precision |
- 3 K type of thermo couple is
- | | |
|----------------------|-------------------|
| A Chromel alumel | B Iron constantan |
| C Chromel Constantan | D Iron alumel |
- 4 Mostly Thermistor has
- | | |
|--|--|
| A Positive temperature coefficient of resistance | B Negative temperature coefficient of resistance |
| C Positive temperature coefficient of inductance | D Negative temperature coefficient of Inductance |
- 5 In an electromagnetic flow meter, the induced voltage is directly proportional to the
- | | |
|---------------------------|---------------------------------|
| A flow rate | B square root of the flow rate. |
| C square of the flow rate | D logarithm of the flow rate |
- 6 Dall tubes permanent pressure loss in comparision to orifice is
- | | |
|--------|------------|
| A More | B Less |
| C Same | D Canø say |
- 7 The subroutine SUBB given below is executed by an 8085 processor. The value in the accumulator immediately after the execution of the subroutine will be:
- SUBB : MVI A, 99h
ADI 11h
MOV C,A
RET
- | | |
|-------|-------|
| A 00h | B 11h |
| C 99h | D AAh |

- 8 The number of bits needed to address 4K memory is
 A 11 B 9
 C 10 D 12
- 9 The TRAP is one of the interrupts available in INTEL 8085. Which one of the following statements is true of TRAP
 A It is level triggered B It is negative edge triggered
 C It is edge triggered and level triggered D It is positive edge triggered
- 10 Mode 1 for 8255 is
 A Strobed I/O B Bi directional I/O
 C Basic I/O D Can be both A and B
- 11 The major disadvantage of a feedback system may be
 A Inaccuracy B Inefficiency
 C Unreliability D Instability
- 12 Which of the following is the time domain method of determining stability of a control system
 A Bode plot B Nyquist plot
 C Polar Plot D Routh's Hurwitz method
- 13 Introduction of feedback decreases the effect
 A Disturbance B Noise
 C Error D All of these
- 14 Thermocouples are
 A Passive transducers B Active transducers
 C Output Transducers D None of these
- 15 McLeod gauge is used for the measurement of
 A Vacuum B Level
 C Flow D Temperature
- 16 Bolometer is used for the measurement of
 A Vacuum B Level
 C Flow D Temperature
- 17 The operation of a magnetic flow meter is based upon
 A Faraday's law B Columb law
 C Pascal law D None of these
- 18 Dummy gauge is mounted on the opposite arm of the active gauge to cancel output differentials due to
 A Temperature variation B Pressure variation
 C pH concentration D Change of blood flow
- 19 What signal corresponds to pin 3 of the operational amplifier IC 741
 A Inverting input B Non inverting input
 C + ve power supply D Ground

- 20 Input Impedance of Op Amp is
 A Infinite B Zero
 C Very high but not infinite D Near to Zero
- 21 Self generating type transducers are
 A Active B Passive
 C Secondary D Inverse
- 22 In which of the following base systems is 123 not a valid number
 A Base 10 B Base 8
 C Base 16 D Base 3
- 23 Modulating signal has
 A Low frequency B High Frequency
 C Low modulation D None of these
- 24 Holding current is used for
 A Diode B Transistor
 C SCR D None of this
- 25 Minority carriers for N type are
 A Electrons B Holes
 C Protons D None of these
- 26 J type of thermo couple consist of
 A Iron constantan B Copper constantan
 C Platinum Platinum Rhodium D Chromel alumel
- 27 Hygrometers are used for the measurement of
 A Humidity B Hydrogen content
 C Viscosity D pH
- 28 PID algorithm does not guarantee
 A Optimal control B Optimal gain
 C Optimal settling time D All of these
- 29 Increase in Gain P for PID control causes
 A Increase in overshoot B Decrease in overshoot
 C Increased stability D None of these
- 30 In root locus, normally which parameter is parameterized
 A Closed loop poles B Closed loop zeros
 C Gain D None of these
- 31 DCS in control system referes to
 A Digital control system B Distributed control system
 C Dedicated control system D None of these
- 32 8051 is _____ pin and _____ bit processor
 A 40,8 B 40,16
 C 24,8 D 24,16

- 33 In 8051 after reset , Stack pointer SP is initialized at which address
 A 08h B 06h
 C 07h D 0Ah
- 34 In 8051 what is the address range of SFR Register bank
 A 00H-77H B 40H-80H
 C 80H-7FH D 80H-FFH
- 35 In 8051, which one of the following interrupt has highest priority
 A IE1 B IE0
 C Serial Interrupt D TF1
- 36 With the feedback system, the fast transient response means
 A Fast rise time B Fast settling time
 C Fast settling and rise time both D Cannot say
- 37 In microprocessor the next instruction to be executed is stored in
 A Program counter B Stack pointer
 C Accumulator D Memory pointer
- 38 Output resistance of ideal Op Amp is
 A Zero B One
 C Very high D Infinite
- 39 For fast changing output following control action is useful
 A Proportional B Integral
 C Derivative D None of these
- 40 Which gas is also known as laughing gas
 A Oxygen B Carbon dioxide
 C Carbon monoxide D Nitrus oxide
- 41 8051 has
 A 128 bytes of RAM B 256 bytes of RAM
 C 1k bytes of RAM D 4k bytes of RAM
- 42 Sling sychrometers are used for the measurement of
 A Pressure B Humidity
 C Vibration D Viscosity
- 43 Which of the following interrupt is non maskable for 8085
 A INTR B RST 5.5
 C TRAP D RST 7.5
- 44 Sensitivity factor of strain gauge is around
 A 0.1 to 10 B 1 to 2
 C 1 to 100 D 1 to 10
- 45 In an INTEL 8085 microprocessor the ADDRESS bus and the DATA bus are
 A Non multiplexed B Multiplexed
 C Same as CONTROL bus D Separate

46 Which of the following expressions is in the sum-of-products (SOP) form?
 A $AB+CD$ B $(A)+(B)$
 C $AB(CD)$ D $(A+B)(C+D)$

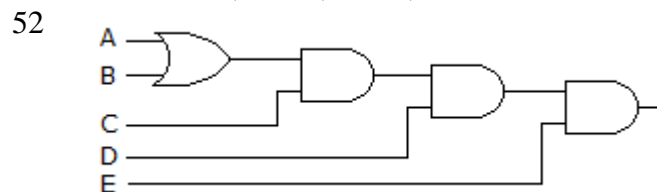
47 IN 8085 I/O mapped system is identified by the address of
 A 8 bit B 16 bit
 C 2 bit D 4 bit

48 Any number with exponent of zero is equal to
 A Zero B One
 C Ten D Same number

49 The Boolean expression for a 3-input AND gate is.
 A $Y=ABC$ B $Y= A+B+C$
 C $Y= (AB)+C$ D $Y=A+(BC)$

50 The output of an AND gate is LOW .
 A when any input is LOW B when ALL input is LOW
 C when any input is HIGH D when all input is HIGH

51 Determine the values of A, B, C, and D that make the sum term $\bar{A} + B + \bar{C} + D$ equal to zero
 A $A = 1, B = 0, C = 0, D = 0$ B $A = 1, B = 0, C = 1, D = 1$
 C $A = 1, B = 0, C = 1, D = 0$ D $A = 0, B = 1, C = 0, D = 0$



Derive the Boolean expression for the logic circuit shown above:

A $ABCDE$ B $C(A+B)D+E$
 C $C(A+B)DE$ D $C(A+B)E+D$

53 How many different voltages can be output from a DAC with a 6-bit resolution
 A 6 B 16
 C 32 D 64

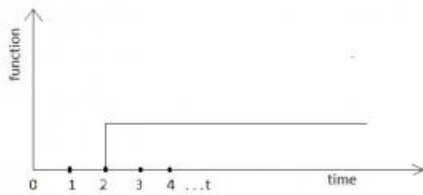
54 In signal flow graph input node is node having only
 A Incoming branches B Outgoing branches
 C Both A and B D None of these

55 Lead compensator is generally used for
 A Steady state response B Transient response
 C Both A and B D None of these

56 Time taken by the response to reach and stay within a specified value is called
 A Settling time B Rise time
 C Response time D Peak time

- 57 A system is stable for
 A Gain Margin and Phase Margin both +ve. B Gain Margin and Phase Margin both -ve.
 C Gain Margin - ve D Phase margin óve
- 58 Integral action in PID control increases
 A Settling time B Overshoot
 C Rise time D None of these
- 59 Which of the following statements is incorrect
 A Static RAM stores information by energizing or de-energising inductors. B RAM is volatile
 C Dynamic RAM stores information by charging or discharging capacitors D RAM is can be written and read quickly.
- 60 Number of sign changes in the entries in 1st column of Routh array denotes the no. of
 A zeroes of system in RHP. B roots of system in RHP.
 C Both A and B D Can't say
- 61 Transfer function of the control system depends on
 A system parameters alone B nature of the input
 C initial conditions of input and output. D nature of the output
- 62 What is the order decided by a processor or the CPU of a controller to execute an instruction
 A decode,fetch,execute B execute,fetch,decode
 C fetch,execute,decode D fetch,decode,execute
- 63 When the micro controller executes some arithmetic operations, then the flag bits of which register are affected for 8051
 A PSW B SP
 C DPTR D PC
- 64 Which of the following is not a characteristic of ideal transducer
 A High dynamic range B Low linearity
 C High repeatability D Low noise
- 65 Which of following represent active transducer
 A Thermocouple B RTD
 C LVDT D Strain guage
- 66 Which of the following is an analog transducer
 A Encoder B Strain guage
 C Digital Techometer D Limit switch
- 67 Closeness of measured value to true value is
 A Accuracy B Precision
 C Correction D Uncertainty

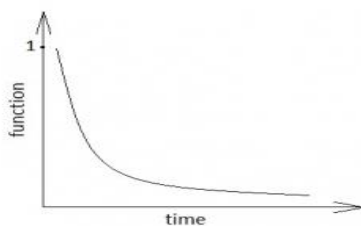
68



What does the function represents

- A $u(t)$
- B $u(t-2)$
- C $u(t+2)$
- D $u(-t)$

69



How will you represent given function

- A $u(t)$
- B $e^{at}.u(t)$
- C $e^{-at}.u(t)$
- D $e^{at}.r(-t)$

70 Resistor is a _____ element.

- A Zero order
- B First order
- C Second order
- D None of the mentioned

71 In which of the following categories RLC network can be included

- A Zero-order system
- B First-order system
- C Second-order system
- D Third-order system

72 Spring is a _____ order system.

- A Zero
- B First
- C Second
- D Can't say

73 Output of a bimetallic element for temperature measurement will be

- A Strain
- B Pressure
- C Displacement
- D Voltage

- 74 Which of the following is true for bimetallic type thermometer?
 A Two metals have same temperature coefficients B Two metals have different temperature coefficient
 C One metal is cooled always D None of the mentioned
- 75 Which of the following represents Reynolds number for laminar flow
 A Less than 2000 B Greater than 4000
 C Infinite D None of the mentioned
- 76 Which of the following represents obstruction type flow measuring systems?
 A Centrifugal force type B Electro magnetic method
 C Flow nozzle device D None of the mentioned
- 77 Error signal in positive feedback system will be _____ input signal.
 A Greater than B Lower than
 C Equal to D Negative of
- 78 LCALL in 8051 is _____ byte instruction
 A 2 byte B 3 byte
 C 4 byte D 1 byte
- 79 What is the meaning of the instruction MOV A,05H for 8051
 A data 05H is stored in the accumulator B fifth bit of accumulator is set to one
 C Content of address 05H is stored in the accumulator D none of the mentioned
- 80 Strain gauge is a
 A Active device and converts mechanical displacement into a change of resistance B Passive device and converts mechanical displacement into a change of resistance
 C Passive device and converts electrical displacement into a change of resistance D Active device and converts electrical displacement into a change of resistance
81. Which of the following is TRUE for the matrices?
 A $|A \cdot B| = |A| \cdot |B|$ B $(A \cdot B)^{-1} = A^{-1} \cdot B^{-1}$
 C $|A + B| = |A| + |B|$ D $(A + B)^T \neq A^T + B^T$
82. The pair of linear equations $kx + 3y + 1 = 0$, $2x + y + 3 = 0$ has exactly one solution if
 A $k = 6$ B k has any value
 C $k \neq 6$ D None of these

83. A 3×3 matrix has eigen values 1, 0, 2. Which is TRUE of the following?
A Trace of A = 0 B A^{-1} does not exist
C A is not diagonalizable D None of these
84. Let $f(x) = |x|$, $-2 \leq x \leq 2$; then
A $f(x)$ is not continuous at $x=0$ and hence not differentiable B $f(x)$ is continuous at $x=0$ but not differentiable at $x=0$
C $f(x)$ is continuous throughout but not differentiable at $x=1$ D $f(x)$ is continuous and differentiable everywhere
85. If $u = x^3 e^{-\frac{x}{y}}$ then $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ is
A $3u$ B $9u$
C $6u$ D $-u$
86. Minimum value of $x^2 + y^2 + 6x + 14$ is
A 5 B 14
C 0 D -3
87. The solution of the differential equation $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} = 0$ is
A $y = c_1 + c_2 \log x$ B $y = c_1 \log x$
C $y = c_1 + c_2 x$ D $y = (c_1 + c_2 x)e^x$
88. The general solution of the differential equation $(D^2 - 2)^2 y = 0$ is
A $y = (c_1 + c_2 x)e^{\sqrt{2}x} + (c_3 + c_4 x)e^{-\sqrt{2}x}$ B $y = c_1 e^{\sqrt{2}x} + c_2 e^{\sqrt{2}x} + c_3 e^{-\sqrt{2}x} + c_4 e^{-\sqrt{2}x}$
C $y = c_1 e^{\sqrt{2}x} + c_2 e^{-\sqrt{2}x}$ D $y = (c_1 + c_2 x + c_3 x^2 + c_4 x^3)e^{\sqrt{2}x}$
89. The function $2x - x^2 + py^2$ is harmonic if p equals to
A 3 B 0
C 1 D 2

90. The value of the integral $\oint_C \frac{\cos z}{z - \pi} dz$, $C: |z - 1| = 3$ is
- | | |
|------------|-------------|
| A πi | B $2\pi i$ |
| C $-\pi i$ | D $-2\pi i$ |
91. $L^{-1} \log\left(\frac{s+b}{s+a}\right)$ is
- | | |
|---------------------------------|---------------------------------|
| A $\frac{e^{-at} - e^{-bt}}{t}$ | B $\frac{e^{-bt} - e^{-at}}{t}$ |
| C $\frac{e^{at} - e^{bt}}{t}$ | D $\frac{e^{bt} - e^{at}}{t}$ |
92. $L\left(\frac{1}{\sqrt{t}}\right)$ is
- | | |
|--------------------------|--------------------------|
| A $\frac{\pi}{\sqrt{s}}$ | B $\frac{\sqrt{\pi}}{s}$ |
| C $\sqrt{\frac{\pi}{s}}$ | D $\frac{1}{\sqrt{2s}}$ |
93. In rolling two fair dice, the probability of getting equal number or numbers with an even product is
- | | |
|-----------|-----------|
| A $6/36$ | B $27/36$ |
| C $30/36$ | D $3/36$ |
94. The approximate value of y at $x=0.2$ using Euler's method for the differential equation $\frac{dy}{dx} = x + y$, $y(0) = 1$, $h = 0.1$ is
- | | |
|-------|--------|
| A 1.2 | B 1.36 |
| C 1.1 | D 1.22 |
95. If A and B are independent events, then which of the following is FALSE?
- | | |
|-------------------|----------------------------|
| A $P(A/B) = P(A)$ | B $P(A \cap B) = P(A)P(B)$ |
| C $P(B/A) = P(B)$ | D None of these |
96. In Simpson's 1/3 rule, interval of integration is divided into subintervals. Number of these subintervals should be
- | | |
|-----------------|-----------------|
| A Odd | B Even |
| C Multiple of 3 | D None of these |

97. The Newton-Raphson formula for finding the square root of a real number R from the equation $x^2 - R = 0$ is

A

$$x_{i+1} = \frac{x_i}{2}$$

B

$$x_{i+1} = \frac{1}{2} \left(x_i + \frac{R}{x_i} \right)$$

C

$$x_{i+1} = \frac{3x_i}{2}$$

D

$$x_{i+1} = \frac{1}{2} \left(3x_i - \frac{R}{x_i} \right)$$

98.

The integrating factor of the differential equation $\frac{dy}{dx} + \frac{x}{1+x}y = 1+x$ is

A

$$e^x$$

B

$$e^x(1+x)$$

C

$$\frac{e^x}{1+x}$$

D

$$e^{x+x^2/2}$$

99. The value of $\int_C (y^2 dx + x^2 dy)$ where C is the boundary of the square

$$-1 \leq x \leq 1, -1 \leq y \leq 1$$

A

$$0$$

B

$$4$$

C

$$2(x+y)$$

D

$$4/3$$

100. A necessary and sufficient condition that line integral $\oint_C \vec{A} \cdot \vec{dr} = 0$ for every closed

curve C is that

A

$$\text{div } \vec{A} = 0$$

B

$$\text{curl } \vec{A} = 0$$

C

$$\text{div } \vec{A} \neq 0$$

D

$$\text{curl } \vec{A} \neq 0$$