

# PGCET-2018

**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 Canøt 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 alumei
- 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 Can't 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

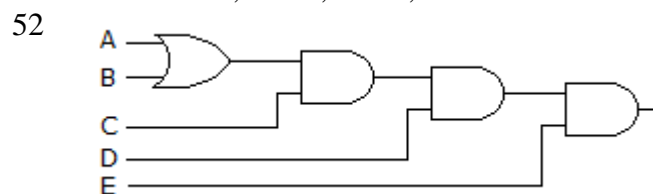
- 49 The Boolean expression for a 3-input AND gate is.  
 A  $Y=ABC$  B  $Y= A+B+C$   
 C  $Y= (AB)+C$  D  $Y=A+(BC)$

- 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

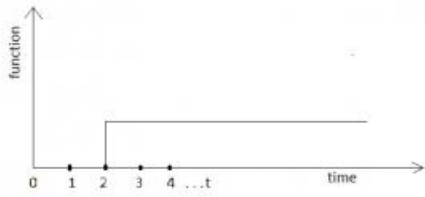
- 54 In signal flow graph input node is node having only  
 A Incoming branches B Outgoing branches  
 C Both A and B D None of these

- 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 Canøt 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

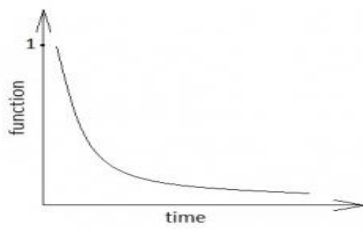
- A     $u(t)$

C     $u(t+2)$

B     $u(t-2)$

D     $u(-t)$

69



How will you represent given function

- A  $u(t)$

B  $e^{at} \cdot u(t)$

C  $e^{-at} \cdot u(t)$

D  $e^{at} \cdot r(-t)$

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 Cannot 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  $3 \times 3$  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  $\pi i$  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

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