

Yashwantrao Chavan College of Science, Karad

Question Bank

Paper XIII (Electronics instrumentation II and Robotics)

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Que.No.1 : Select the correct alternative (One mark each)

- 1) The smallest addressable dot on any display device is called -----.
 - a) Dark spot
 - b) Light spot
 - c) Pixel
 - d) None of the above
- 2) In ----- the picture on the screen is built by moving the electron beam in series of scan lines.
 - a) LCD
 - b) VDU
 - c) Magnetic recorder
 - d) None of the above
- 3) ----- printer can give the colour prints.
 - a) Dot matrix
 - b) Ink jet
 - c) Laser jet
 - d) All of the above
- 4) In magnetic disk the time taken by head for movement on the required track is called as - -----.
 - a) run time
 - b) seek time
 - c) propagation time

d) delay time

5) In magnetic recording the head wait until the required segment moves under it, this time is

called as -----.

a) Seek time

b) Run time

c) Delay time

d) Latency time

6) The address is essential to identify the segments and tracks to record in magnetic disk, writing of this information is called -----.

a) Recording

b) Formatting

c) Scanning

d) All of the above

7) ----- recording can be easily corrupted by dust and scratches.

a) Magnetic recording

b) Optical recording

c) Printer

d) None of the above

8) In seven segment display to display number 0, ----- segment is off.

a) a

b) f

c) g

d) c

9) In seven segment LED display, the function of the decoder driver is to convert -----
-- signal in digital output.

a) Gray code

b) Hexadecimal

c) Octal

d) BCD

10) ----- is comparing the output of measuring system with standards of known accuracy.

a) Error

b) Precision

c) Resolution

d) Calibration

11) ----- is used to measure the speed of the rotating shaft.

a) Multimeter

b) Frequency meter

c) Tachometer

d) Voltmeter

12) To measure the hydrogen ion activity in a solution ----- meter is used.

a) Ammeter

b) Voltmeter

c) Tachometer

d) pH meter

13) ----- is a quantitative measurement of acidity.

a) Solubility

b) Current

c) pH

d) rpm

14) A neutral solution has a pH of -----.

a) 0

b) 1

c) Infinite

d) 7

15) pH of alkaline solution is -----.

a) 0

b) 7

c) Greater than seven

d) Less than seven

16) pH of acidic solution is -----.

a) 0

b) 7

c) Greater than seven

d) Less than seven

17) In CRO the signal is displayed in ----- .

a) Frequency domain

b) Time domain

c) Amplitude domain

d) None of the above

18) In spectrum analyzer the signal is displayed in -----.

a) Frequency domain

b) Time domain

c) Phase domain

d) All of the above

19) Spectrum analyzer provides a calibrated graphical display on its CRT, with -----
-----.

a) Amplitude on x axis and time on y axis

b) Frequency on x axis and amplitude on y axis

c) Time on y axis and amplitude on x axis

d) Voltage on x axis and time on y axis

20) In spectrum analyzer the height represents ----- and the horizontal location represents the -----.

a) Amplitude, Frequency

b) Frequency, Amplitude

c) Time, Voltage

d) Frequency, voltage

21) The bandwidth of DSO is limited by -----.

a) Speed of A/D converter.

b) Speed of attenuation and offset circuit

c) Speed of the amplifier

d) All of the above

22) In ----- the waveform can be stored and can be repetitively read out. a)

Function generator

b) CRO

c) DSO

d) Multimeter

23) ----- is the equipment which produces different types of waveforms at the same time.

a) Cathod ray oscilloscope

b) Function generator

c) Tachometer

d) Multimeter

24) Frequency of the waveform generated in function generator is controlled by -----
--.

a) Changing the magnitude of charging current

b) By varying the capacitor in LC or RC circuit

c) By varying the resistance in RC circuit.

d) All of the above

25) The output waveform obtained from the integrator circuit in function generator is -----

----- a) Square wave

b) Sine wave

c) Triangular wave

d) All of the above

26) The output waveform obtained from the flip-flop in function generator is -----

--- a) Square wave

b) Sine wave

c) Triangular wave

d) All of the above

27) In function generator ----- is used to convert triangular wave into sine wave. a) RC network

b) LC network

c) Resistance diode network

d) LR network

28) ----- is called as function generator IC.

a) IC LM35

b) IC 7805

c) IC 741

d) IC 8038

29) In function generator designed using IC 8038, FOR 50% duty cycle the condition is ----

----- a) $R_A = R_B$

b) $R_A < R_B$

c) $R_A > R_B$

d) $R_A = 2R_B$

30) In function generator IC 8038 the sine, triangular and square wave are obtained at pin No.----- simultaneously.

a) 1,2 and 3

b) 2,3 and 9

c) 3, 4 and 6

d) 1 ,7 and 11

31) The process of changing the resting potential state to the action potential state due to applied stimulus potential called-----.

a) Depolarization

b) Repolarization

c) Refraction

d) All of the above

32) The process of changing the action potential state to the resting potential state called ---

-----.

a) Depolarization

b) Repolarization

c) Refraction

d) None of the above

33) When the action potential generated, there is brief period of the time during which cell is does not respond to any stimulus is called as-----.

a) Refractory period

b) Resting period

c) Actuation period

d) None of the above

34) The electrochemical activities are occurs in the human body cells gives to rise to ionic voltages known as-----.

- a) bioelectric potentials
- b) action potentials
- c) working potentials
- d) none of the above

35) ----- is a lower base value of the ionic voltages during cell is in the resting condition.

- a) Resting potential
- b) Action potential
- c) Working potential
- d) None of the above

36) ----- is used to diagnose various disease and conditions associated with the heart. a) Electro –cardiogram(ECG)

- b) Electro-encephalogram(EEG)
- c) Electro-myogram(EMG)
- d) Electro-retinogram (ERG)

37) ----- represents the record of the electrical activity of the brain.

- a) Electro –cardiogram(ECG)
- b) Electro-encephalogram(EEG)
- c) Electro-myogram(EMG)
- d) Electro-retinogram (ERG)

38) ----- represents a record of electrical activity of the skeletal muscles.

- a) Electro –cardiogram(ECG)
- b) Electro-encephalogram(EEG)
- c) Electro-myogram(EMG)
- d) Electro-retinogram (ERG)

39) ----- is used to detect the retinal activity.

- a) Electro-cardiogram(ECG)
- b) Electro-encephalogram(EEG)
- c) Electro-myogram(EMG)
- d) Electro-retinogram (ERG)

40) ----- represents the record of corneal-retina potential associated with the eye

movements.

- a) Electro-cardiogram(ECG)
- b) Electro-encephalogram(EEG)
- c) Electro-oculogram (EOG)
- d) Electro-retinogram (ERG)

41) ----- represents the record of the potentials associated with the muscle activity in the gastro-intestinal tract.

- a) Electro-gastrogram (EGM)
- b) Electro-encephalogram(EEG)
- c) Electro-oculogram (EOG)
- d) Electro-retinogram (ERG)

42) Part of the mechanism which has motion relative to some other part is termed as -----

-----.

- a) Links
- b) Node
- c) Joint
- d) None of the above

43) The point of attachment of one link with the other link is called ----- a)

Links

b) Node

c) chain

d) None of the above

44) A sequence of joints and links is known as a -----.

a) kinematic chain

b) links

c) node

d) all of the above

45) In four bar chain arrangement at least one link will be capable of making a full revolution with respect to the fixed link only when-----.

a) $(\text{length of the shortest link}) + (\text{the length of the longest link}) \leq (\text{sum of the lengths of the other two links})$

b) $(\text{length of the shortest link}) + (\text{the length of the longest link}) \geq (\text{sum of the lengths of the other two links})$

c) $(\text{length of the shortest link}) + (\text{the length of the longest link}) = (\text{sum of the lengths of the other two links})$

d) $(\text{length of the shortest link}) + (\text{the length of the longest link}) > (\text{sum of the lengths of the other two links})$

46) A ----- is a body which rotates or oscillates and in doing so imparts a reciprocating or oscillatory motion to a follower.

a) Shaft

b) Cam

c) Chain

d) All of the above

47) If two meshed gear wheels A and B are there with 60 teeth on wheel A and 180 teeth on wheel B. Then wheel A must rotate through -----revolutions in the same time as wheel B rotates through one revolution.

- a) 1
- b) 2
- c) 3
- d) 4

48) Consider two meshed gear wheels A and B with 40 teeth on wheel A and 80 teeth on wheel

B. Then the relation between angular velocity ω_a of wheel A and ω_b of wheel B is-----

- a) $\omega_a = \omega_b$
- b) $2\omega_a = \omega_b$
- c) $\omega_a = 2\omega_b$
- d) $\omega_a = 4\omega_b$

49) ----- is the ratio of the angular speeds of a pair of intermeshed gear wheels.

- a) Power ratio
- b) Torque ratio
- c) Gear ratio
- d) All of the above

50) The term -----is used to describe a series of intermeshed gear wheels. a)

- gear train
- b) gear bank
- c) gear ratio
- d) none of the above

51) The angular velocity of a wheel is -----to the number of teeth on the

- wheel. a) Directly proportional
- b) Inversely proportional
- c) Equal
- d) Not equal

52) Consider a single gear train consisting of wheels A, B and C, with A having 9 teeth, B having 18 teeth and C having 27 teeth. Then the gear ratio is-----.

a) 1

b) 2

c) 3

d) 1/3

53) The wheel which changes only the direction of rotation of the output wheel is termed as -----.

a) Flying wheel

b) Central wheel

c) Idler wheel

d) All of the above

54) When two wheels are mounted on a common shaft then that gear train is called as -----

-----.

a) Gear bank train

b) Compound gear train

c) Series gear train

d) None of the above

55) ----- gears can be used to transform either linear motion to rotational motion or rotational motion to linear motion.

a) The rack and pinion

b) Compound

c) Idler wheel

d) All of the above

56) ----- arrangement is used in robots to drive the arm.

a) The ball screw

b) The lead screw

c) Ratchet and pawl

d) The rack and pinion

57) The ----- arrangement can be used to lock a mechanism when it is holding a load. a) The ball screw

b) The lead screw

c) Ratchet and pawl

d) The rack and pinion

58) The motion of one cylinder being transferred to the other with the help of -----.

a) Rod

b) Bearings

c) Belt

d) None of the above

59) If the distance between two shaft is large----- drive is more suitable. a) Gear

b) Belt

c) Pulley

d) None of these

60) If the distance between two shaft is small ----- drive is more suitable. a) Belt

b) Gear

c) Pulley

d) None of these

61) ----- can transmit power over a long distances between pulley centers. a) V

belt

b) Round belt

c) Timing belt

d) Flat belt

62) ----- belt has circular cross section and is used with grooved pulleys. a) V

belt

b) Round belt

c) Timing belt

d) Flat belt

63) ----- belts require toothed wheels.

a) V belt

b) Round belt

c) Timing belt

d) Flat belt

64) The ----- does not stretch or slip and transmit power at a constant angular velocity ratio.

a) V belt

b) Round belt

c) Timing belt

d) Flat belt

65) The advantages of using bearing in mechanical systems is/are -----.

a) To avoid friction

b) Avoid the wastage of energy due to friction

c) To support the rotating shaft

d) All of the above

66) ----- type of bearing is used for radial loads but cannot be used for axial loads. a)

Deep-groove

b) Filling-slot

c) Angular contact

d) Double-row

67) ----- type of bearing is good for both radial and axial loads and is better for axial loads.

a) Deep-groove

b) Filling-slot

c) Angular contact

d) Double-row

68) To withstand a severe shaft misalignment a ----- bearing is used. a) self – aligning

b) filling slot

c) deep groove

d) angular contact

69) ----- type of bearing is good for radial loads and good in one direction for axial load.

a) Tapper roller

b) Straight roller

c) Needle roller

d) None of the above

70) ----- type of bearing has a roller with a high length/diameter ratio and used in situation where there is insufficient space for the equivalent ball or roller bearing. a)

Tapper roller

b) Straight roller

c) Needle roller

d) None of the above

71) The function of the free-wheeling diode connected across the relay is -----.

a) To protect the circuit from back e.m.f. produced

b) To turn on the relay

c) To turn off the relay

d) None of the above

72) ----- is a electro- mechanical switch.

a) Transistor

b) SCR

c) TRIAC

d) Relay

73) ----- is/are solid state switch.

a) Transistor

b) MOSFET

c) Thyristors

d) All of the above

74) ----- is used for switching high power applications.

a) Diode

b) Transistor

c) SCR

d) None of the above

75) ----- is bidirectional switch.

a) Transistor

b) MOSFET

c) SCR

d) TRIAC

76) The ----- can be turned on in either the forward or reverse direction. a)

Transistor

b) MOSFET

c) SCR

d) TRIAC

77) When transistor acts as open switch then -----.

a) $I_c = 0$, $V_{CE} = V_{cc}$

b) $I_c = I_{SAT}$, $V_{CE} = V_{cc}$

c) $I_c = 0$, $V_{CE} = 0$

d) $I_c = 0$, $V_{CE} = 0$

78) When transistor acts as close switch then -----.

a) $I_c = V_{cc}/R_c$ and $V_{CE} = V_{CE(sat)}$

b) $I_c = I_c/R_c$ and $V_{CE} = 0$

c) $I_c = V_{cc}/R_c$ and $V_{CE} = V_{cc}$

d) $I_c = 0$ and $V_{CE} = V_{CE(sat)}$

79) ----- is a voltage controlled device.

a) Transistor

b) MOSFET

c) SCR

d) TRIAC

80) For very high frequency switching ----- is used.

a) Transistor

b) MOSFET

c) SCR

d) TRIAC

81) The advantage of three phase motor over single phase motor is that it is -----

- a) Faster

b) Slower

c) Self starting

d) Cheaper

82) ----- are used when a precise speed is required.

a) Synchronous motors

b) Asynchronous motors

c) Induction motors

d) All of the above

83) ----- is/are the advantage of A.C. motors over D.C. motor.

a) A.C motors are cheaper

b) A.C motors are more rugged

c) A.C. motors are more reliable and maintenance free .

d) All of the above

84) ----- is the angle through which the rotor rotates for one switching change for the stator coils.

a) Acute angle

b) Step angle

c) Minute angle

d) All of the above

85) ----- is the maximum torque that can be applied to a powered motor without moving it from its rest position and causing spindle rotation.

a) Holding torque

b) Pull in torque

c) Pull out torque

d) None of the above

86) ----- is the maximum torque against which a motor will start, for a given pulse rate, and reach synchronism without losing a step.

a) Holding torque

b) Pull in torque

c) Pull out torque

d) None of the above

87) ----- is the maximum torque that can be applied to a motor, running at a given stepping rate, without losing synchronism.

a) Holding torque

b) Pull in torque

c) Pull out torque

d) None of the above

88) ----- is the maximum switching rate at which a loaded motor can start without losing a step.

- a) Pull in rate
- b) Pull out rate
- c) Slew rate
- d) Pulse rate

89) ----- is the switching rate at which a loaded motor will remain in synchronism as the switching rate is reduced.

- a) Pull in rate
- b) Pull out rate
- c) Slew rate
- d) Pulse rate

90) ----- is the range of switching rates between pull in and pull out within which the motor runs in synchronism but cannot start up or reverse.

- a) Pull in range
- b) Pull out range
- c) Slew range
- d) All of the above

91) The main advantages of robotics include :

- a) Reliability
- b) Increased flexibility
- c) Low cost in long run
- d) All of the above

92) The main function of robot is

- a) Sensing the environment by external sensors
- b) Decision making based on the information received from the sensor
- c) Performing the task decided

d) All of the above

93) A machine can qualify as a robot subject to which of the following condition?

a) Reprogrammable

b) Sensing and perception

c) Function autonomously and/or interact with human being

d) All of the above

94) Tele-robots are

a) So designed as to navigate and carry out the task with the intervention of human beings.

b) Built to mimic humans.

c) Carry out different tasks.

d) Guided by human operators through remote control.

95) A robot may be designed for which of the following jobs?

a) To simply pick up and place the workpieces.

b) To interact with and work load a lathe, a milling machine or any equipment.

c) To perform some assembly work.

d) All of the above.

96) Which of the following methods of gripping is used in a robot?

a) Mechanical gripping

b) Magnetic gripping

c) Vacuum gripping

d) All of the above

97) Which of the following drives are clean and quiet with high degree of accuracy and reliability?

a) pneumatic drives

b) hydraulic drives

c) electrical drives

d) all of the above

98) A controller includes which of the following components?

- a) Memory
- b) Computational unit
- c) Hardware to interface with external world (sensors and actuators)
- d) All of the above

99) Which of the following sensors non -contact type robotic sensors?

- a) Force sensors
- b) Touch sensors
- c) Torque sensors
- d) None of the above

100) Which of the following sensors contact type robotic sensors?

- a) Proximity sensors
- b) Electro-optical sensors
- c) Range imaging sensors
- d) None of the above

101) 'Pitch motion enables

- a) Rotation of wrist
- b) Rightward or leftward swiveling movement of the wrist
- c) Up and down movement of the wrist and involves rotational movement as well
- d) None of these

102) In which of the following configurations, there is a telescopic arm which pivots about a horizontal axis and also rotates about a vertical axis?

- a) Cylindrical configuration
- b) Spherical configuration
- c) Jointed-arm configuration
- d) None of the above

103) Which of the following configuration has three mutually perpendicular axes?

- a) Cartesian coordinate configuration
- b) Cylindrical configuration

c) Spherical configuration

d) None of the above

104) Mechanical errors arise due to which of the following causes?

a) Hysteresis

b) Deflection of links

c) Hydraulic leaks

d) All of the above

105) Which of the following controllers is most popular?

a) Drum controller

b) Air logic controller

c) Programmable controller

d) Microprocessor based controller

106) In ----- robot control system robots move their arms in an open loop fashion between exact end positions on each axis.

a) Non-servo

b) Servo

c) Point to point

d) Continuous path

107) In ----- robots incorporate feedback devices on the joints or actuators of the manipulator which continuously measure the position of each axis.

a) Non-servo control

b) Servo control

c) Point to point control

d) Continuous path control

108) In ----- robots each joints is controlled by an independent position servo with all joints moving from position to position independently.

- a) Non-servo control
- b) Servo control
- c) Point to point control
- d) Continuous path control

109) ----- is used where the continuous path of the end effector is of primary importance.

- a) Non-servo control
- b) Servo control
- c) Point to point control
- d) Continuous path control

110) -----is a Non-tactile sensor.

- a) Force sensors
- b) Torque sensors
- c) Proximity sensors
- d) Touch sensors

111) ----- is a Tactile sensor.

- a) Proximity sensors
- b) Electro-optical sensors
- c) Range imaging sensors
- d) Force sensors

112) -----are elements between the actuators and the joints of the mechanical linkage.

- a) Sensors
- b) Actuators
- c) Transmissions
- d) Controller

113) ----- system uses compressed air to move the robot arm. a) Electrical drives

b) Hydraulic drives

c) Pneumatic drives

d) All of the above

114) ----- system fluid at a higher pressure passes through control valves. a) Electrical drives

b) Hydraulic drives

c) Pneumatic drives

d) All of the above

115) If the output of the actuator is not directly suitable for the driving the robot linkage - -- ----- is used.

a) Sensors

b) Actuators

c) Transmissions

d) Controller

116) If the output of actuator is kinematically different from the joint motion ----- ---- is used.

a) Sensors

b) Actuators

c) Transmissions

d) Controller

117) ----- act as a feedback devices to direct further actions of the manipulator arm and is used to interact with the robots working environment. a) Sensors

b) Actuators

c) Transmissions

d) Controller

Que.No.2 Long answer questions (Eight marks each)

- 1) With the help of block diagram explain the working principle of Cathod Ray Oscilloscope.
 - 2) Explain the operation of LCD and mention its advantages and disadvantages over LED display.
 - 3) Describe the operation of digital storage oscilloscope with its block diagram.
 - 4) Explain the basic function generator with its block diagram.
 - 5) Explain the mechanical aspects of motor selection in mechanical actuation systems.
 - 6) What is the advantages of use of gear in mechanical actuation system? Explain the simple and compound gear trains with gear ratio.
 - 7) With neat labeled diagram explain the relay used in electrical actuation system.
 - 8) Describe the operating principle of stepper motor.
 - 9) Mention the specifications of stepper motor.
 - 10) Explain briefly the following components of robot
 - i) Manipulator arm
 - ii) End effector
 - iii) Controller
 - iv) Sensors
 - 11) Explain the servo control system used in the robots.
 - 12) Explain the engine management system with the help of block diagram.
 - 13) Explain briefly the control system for an automatic camera.
 - 14) With the help of block diagram explain the solar tracking system.
 - 15) With the help of block diagram explain the automatic water control system.
 - 16) With the help of block diagram explain the satellite tracking system.
 - 17) Describe the operating principle of AC motor.
 - 18) Explain the working principle of brush type d.c. motor.
 - 19) Explain the voltage control principle using thyristor. 20) How can be robots be controlled? Explain briefly.
- Que.No.3 : Short answer type questions (Four marks each)

- 1) Draw the labeled block diagram of CRO.
- 2) Write short note on VDU.
- 3) Explain the working principle of magnetic recording.
- 4) Explain the working principle of optical recording.
- 5) Explain briefly the display arrangement using LED.
- 6) Write short note on digital tachometer.
- 7) Write short note on digital pH meter.
- 8) Explain the blood pressure measurement technique used in human body.
- 9) Explain the working principle ECG.

- 10) With the help of diagram explain four bar chain arrangement used in mechanical actuation system.
- 11) What is a bearing? How are bearing classified?
- 12) Explain the terms mechanism and kinematic chain.
- 13) What are the advantages and disadvantages of toothed gear?
- 14) Explain briefly the mechanical switching device Relay.
- 15) Explain how transistor acts as a electrical switching device?
- 16) State advantages and applications of stepper motor.
- 17) What is meant by electrical actuation system? What are the devices used in such systems?

- 18) Define Robot and mention its advantages and disadvantages.
- 19) Explain the non servo control system in robot.
- 20) Compare hydraulic, pneumatic and electric drive systems in robot. 21) Differentiate between general purpose and special purpose robot.
- 22) What are the basic components of the robotic system?
- 23) Explain briefly the end effector in robot.
- 24) Explain briefly the controllers used in robot.
- 25) Explain point to point control in robot.
- 26) Explain continuous path control in robot.
- 27) How dose autofocusing is done in the digital camera?
- 28) Write short note on shaft speed control system.
- 29) Write short note on automatic water control system.
- 30) Write short note on copy machine.
- 31) Explain briefly the solar tracker system.
- 32) Explain briefly the satellite tracker system