Subject: - Industrial Automation (22534)

SYLLABUS

Chapter No.	Name of chapter	Marks With Option
1	Introduction to Industrial Automation	06
2	PLC Fundamentals	26
3	PLC Programming & Applications	38
4	Electric Drives& Special Machines	16
5	Supervisory Control & Data Acquisition System	16
	Total Marks: -	**102**

BOARD THEORY PAPER PATTERN FOR IAU (22534)

Q.1		**Attempt any FIVE** **5*2=10**
	a)	PLC Programming & Applications
	b)	PLC Programming & Applications
	c)	Supervisory Control & Data Acquisition System
	d)	Electric Drives& Special Machines
	e)	PLC Fundamentals
	f)	PLC Fundamentals
	g)	Introduction to Industrial Automation
Q.2		**Attempt any THREE** **3*4=12**
	a)	PLC Fundamentals
	b)	PLC Programming & Applications
	c)	Introduction to Industrial Automation
	d)	PLC Fundamentals

Q.3		**Attempt any THREE** **3*4=12**
	a)	Electric Drives& Special Machines
	b)	PLC Fundamentals
	c)	PLC Programming & Applications
	d)	Supervisory Control & Data Acquisition System
Q.4		**Attempt any THREE** **3*4=12**
	a)	Supervisory Control & Data Acquisition System
	b)	PLC Programming & Applications
	c)	PLC Fundamentals
	d)	PLC Programming & Applications
	e)	Electric Drives& Special Machines
Q.5		**Attempt any TWO** **2*6=12**
	a)	PLC Fundamentals
	b)	PLC Programming & Applications
	c)	Electric Drives& Special Machines
Q.6		**Attempt any TWO** **2*6=12**
	a)	PLC Programming & Applications
	b)	Supervisory Control & Data Acquisition System
	c)	PLC Programming & Applications

CLASS TEST - I

PAPER PATTERN

COURSE: - Industrial Automation (22534)

PROGRAMME: - E & TC Engineering

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
1	**Introduction to Industrial Automation**	**CO-534.1**
2	**PLC Fundamentals**	**CO-534.2**
3	**PLC Programming & Applications**	**CO-534.3**

Q.1	**Attempt any FOUR** 4*2=8Marks	Course Outcome (CO)
a)	PLC Fundamentals	CO-534.2
b)	Introduction to Industrial Automation	CO-534.1
c)	PLC Fundamentals	CO-334.2
d)	Introduction to Industrial Automation	CO-534.1
e)	PLC Programming & Applications	CO-534.3
f)	PLC Fundamentals	CO-334.2
Q.2	**Attempt any THREE 3*4=12 Marks**	
a)	PLC Fundamentals	CO-534.2
b)	PLC Programming & Applications	CO-534.3
c)	Introduction to Industrial Automation	CO-534.1
d)	PLC Fundamentals	CO-534.2

CLASS TEST - II

PAPER PATTERN

COURSE: - Industrial Automation (22534)

PROGRAMME: - E & TC Engineering

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
3	**PLC Programming & Applications**	**CO-534.3**
4	**Electric Drives& Special Machines**	**CO-534.4**
5	**Supervisory Control & Data Acquisition System**	**CO-534.5**

Q.1	**Attempt any FOUR** **4*2=8Marks**	**Course Outcome (CO)**
a)	Electric Drives& Special Machines	CO-534.4
b)	Supervisory Control & Data Acquisition System	CO-534.5
c)	Supervisory Control & Data Acquisition System	CO-534.5
d)	PLC Programming & Applications	CO-534.3
e)	Electric Drives& Special Machines	CO-534.4
f)	Supervisory Control & Data Acquisition System	CO-534.5
Q.2	**Attempt any THREE** **3*4=12 Marks**	
a)	Supervisory Control & Data Acquisition System	CO-534.5
b)	Electric Drives& Special Machines	CO-534.4
c)	Supervisory Control & Data Acquisition System	CO-534.5
d)	Electric Drives& Special Machines	CO-534.4

COURSE OUTCOME (CO)

COURSE: - Industrial Automation (22534)

PROGRAMME: - E & TC Engineering

CO. NO.	Course Outcome
CO-534.1	Identify different components of Automation system.
CO-534.2	Interface the given I/O device with the appropriate PLC module.
CO-534.3	Prepare a PLC Ladder program for the given application.
CO-534.4	Select the suitable motor drives for the specified application.
CO-534.5	Prepare a simple SCADA application.

1. Introduction to Industrial Automation

Position in Question Paper **Total Marks-06**

Q.1. g) 2-Marks.
Q.2. c) 4-Marks.

Descriptive Question

1. What is Automation?
2. State the need of automation in industry.
3. What are the different benefits of automation?
4. List the different automation tools used in process.
5. State eight application areas where PLC is used.
6. List four applications of automation in the field of process industries.
7. Draw the block diagram of DCS system.
8. State four applications of automation in the field of Medical.

MCQ Question

(Total number of Question=Marks*3=06*3=18)

Note: Correct answer is marked with **bold.**

1. _____is the full form of SCADA?
   a) Supervisory Control and Document Acquisition
   b) **Supervisory Control and Data Acquisition**
   c) Supervisory Column and Data Assessment
   d) Supervisory Column and Data Assessment
2. DCS is a _____
   a) **Distributed Control System**
   b) Data Control System
   c) Data Column System
   d) Distributed Column System
3. The control in SCADA is _____
   a) Online control
   b) Direct control
   c) **Supervisory control**
   d) Automatic control
4. _____is SCADA?
   a) Software
   b**) Process**
   c) System
   d) Hardware
5. _____ did the SCADA start?
   a) 1980s
   b) 1990s
   c) 1970s
   d) **1960s**
6. ____ did Windows become the world standard operating system?
   a) 1980s
   b) **1990s**
   c) 1970s
   d) 1960s
7. _____ of the following is an example of the SCADA system?
   a) Emerson Delta V
   b) Honeywell Plant Scape
   c) Yokogawa CENTUM
   d) **Power Studio Deluxe**
8. How many levels are present in a complex SCADA system?
   a) 3 – levels
   b) 5 – levels
   c) **4 – levels**
   d) 6 – levels
9. _____ of the following is the heart of a SCADA system?
   a) PLC
   b) HMI
   c) Alarm task
   d**) I/O task**
10. The acronym DCS stands for
    (a) Delta Console Services
    (b) **Distributed Control System**
    (c) Direct Cascade Sequencing
    (d) Differential Concentration Switch

11. In an open loop control system
    (a) **Output is independent of control input**
    (b) Output is dependent on control input
    (c) Only system parameters have effect on the control output
    (d) None of the above
12. The result of the act of adjustment is called
    a) Response
    b) **command**
    c) process control
    d) process controller
13. The automatic control of variables is known as
    a) Response
    b) command
    c) **process control**
    d) process controller
14. Robots are specified by
    a) Pay load
    b) dimension of work envelope
    c) degree of freedom
    d) **all of the mentioned**
15. Programming a robot by physically moving it through the trajectory you want it to follow is called
    a) Contact sensing control
    b) **continuous path control**
    c) pick and place control
    d) robot vision control
16. Full name of the DCS is_
    a) Designed Control System
    b) **Distributed Control System**
    c) Display Control System
    d) Dedicated Control System
17. _____ Automation tools used in process
    a) **Fixed automation**
    b) Variable automation
    c) Programmable automation
    d) Both a & b
18. In Process control the basic objective is to_____ the value
    a) Regulate
    b) Control
    c) **Both a& b**
    d) Process

2. PLC Fundamentals

Position in Question Paper **Total Marks-26**

Q.1. e) 2-Marks.
Q.1. f) 2-Marks.
Q.2. a) 4-Marks.
Q.2. d) 4-Marks.
Q.3. b) 4-Marks.
Q.4. c) 4-Marks.
Q.5. a) 6-Marks.

Descriptive Question

1. What are the different modules of PLC?
2. Draw & Explain the architecture of PLC.
3. List the advantages of PLC over conventional relay logic.
4. Explain the PLC operating cycle.
5. Draw & Explain block diagram of DC input module.
6. Draw & Explain the sourcing and sinking input module in details.
7. Draw the diagram of TTL output module.
8. State the classification of PLC based on types and size.
9. Explain the redundancy in PLC.

MCQ Question

(Total number of Question=Marks*3=18*3=54)

Note: Correct answer is marked with **bold**

1. PLC's analog input/output has_____
   a) 1 Bit address
   b) 1 Byte address
   c) **1 Word address**
   d) 1 double word address
2. PLC's having less than _____inputs & outputs are called as small PLC
   a.50
   b.200
   c.**100**
   d.150
3. Medium PLC has ____and _____
   a. **4000 to 8000**
   b. 1000 to 4000
   c. 100 to 200
   d. 400 to 500
4. ON-OFF is the type of_____ Mode
   a. **Discontinuous controller**
   b. On Off control
   c. Dead time
   d. None of the above
5. _____ is the basic components used in the field devices
   a. **Sensors**
   b. Relay
   c. Motor
   d. Both a & b
6. The PLC was invented in _____
   a. 1960
   b. **1970**
   c. 1980
   d. 1990
7. PLC is more reliable than_____
   a. Switch
   b. Motor
   c. **Relay**
   d. Button
8. _____ is the different modules of PLC
   a. Input module
   b. Power supply
   c. **Both a & b**
   d. None of the above
9. Programming devices is used to communicate between___
   a. **User & PLC**
   b. I/O & PLC
   c. HMI & PLC
   d. Power supply & PLC
10. Sinking & sourcing terms are depends on the direction of ____
    a. Voltage flow
    b. **Current flow**
    c. Supply flow
    d. Both a & b
11. Relay O/P modules are used to interface_____
    a. DC load
    b. AC load
    c. **Both a & b**
    d. None of the above
12. Depending on the size of I/O the main two types of PLC's are_____
    a. Fixed PLC
    b. Modular PLC
    c. Medium PLC
    d. **Both a & b**
13. Digital Input of CPU is____
    a. 12VDC
    b. 230VAC
    c. **24VDC**
    d. 10VDC

14. _____ contacts are actuated they disrupt the power supply through them.
a. normally open type
b. **normally closed type**
c. both a. and b.
d. none of the above

15. The capability of convention relay systems for complex operations is _____ that of the PLCs
a. **poor than**
b. excellent than
c. as good as
d. unpredictable as

16. How is the noise immunity of PLCs to electrical noises as compared to that of conventional relay controllers?
a. **poor**
b. excellent
c. as good as noise immunity of conventional relay controllers
d. unpredictable

17**.** _____ of PLCs can be done in very little time**.**
a. Programming
b. Installation
c. Commissioning
d. **All of the above**

18. PLC can be _____ in plant to change the sequence of operation**.**
a. only programmed
b. only reprogrammed
c. **programmed and reprogrammed**
d. able to give a set point

19. The PLC is used in _____
a. machine tools
b. automated assembly equipment
c. moulding and extrusion machines
d. **all of the above**

20. _____of the following cannot be an input that is given to the PLC?
a. Manual switches
b. Relays
c. Sensors
d. **None of the above**

21. _____the most popular language for PLCs is
a. Ladder diagram
b. C++
c. OOP+
d. VHDL

22. An example of discrete (digital) control is:
a. Varying the volume of a music system
b. **Turning a lamp ON or OFF**
c. Varying the brightness of a lamp
d. Controlling the speed of a fan

23. One of the following is an input device
a. Motor
b. Light
c. Valve
d**. Sensor**

24. _____one of the following is not a PLC manufacturer
a. Siemens
b. Mitsubishi
c. **Microsoft**
d. ABB

25. Solenoids, lamps, motors are connected to
a. Analog output
b. **Digital output**
c. Analog input
d. Digital input

26. _____ is the different modules of PLC
a. Input module
b. CPU
C. Memory
d. **All the Above**

27. Input devices are of the following types
a. sensors
b. Timers
c. Limit Switches
d. **All the above**

28. Central processing of the PLC Process
a. store the user program
b. manage operating system
c. **both a & b**
d. none of the above

29. Memory system is the function of CPU that stores
a. control program
b. data
c. Fixed data
d. **both a & b**

30. Output devices are
a. Motors
b. Timers
c. Alarms
d. **All the above**

31. The Discrete input module AC voltage is
a. **24Vac**
b.12Vac
c. 72Vac
d. 56Vac

32. The Discrete input module DC voltage is
a. **120Vdc**
b. 160Vdc
C.170Vdc
d. 200Vdc

33. Sinking and Sourcing terms are depends on the direction of
a. **Current flow**
b. Voltage flow
c. Power flow
d. Both a & b

34. The acronym PLC stands for
(A) Pressure Load Control
(B) **Programmable Logic Controller**
(C) Pneumatic Logic Capstan
(D) PID Loop Controller

35. The first company to build PLCs was
a) General Motors
b) Allen Bradley
c) Square D
d) Modicon

36. The PLC was invented by
a) Bill Gates
b) Dick Morley
c) Bill Landis
d) Tod Cunningham

37. One of the following is an input device
a. Motor
b. Light
c. Valve
d.Sensor

38. Solenoids, lamps, motors are connected to
a. Analog output
b. Digital output
c. Analog input
d. Digital input

39. Current flows into the _____
a) Input terminal of a sinking DC input module
b) Input terminal of a sinking output field device
c) Output terminal of a sinking input field device
d) All of the above

40. _____ one item in the input module circuit above should be changed to make it correct.
a) The battery polarity
b) Input module should be sinking
c) Field device should be sinking
d) Current flow direction

41. The PLC is used in _____.
a. machine tools
b. automated assembly equipment
c. moulding and extrusion machines
d. all of the above

42. Relay O/P modules are used to interface_____
a. DC load
b. AC load
c. **Both a & b**
d. None of the above

43. Depending on the size of I/O the main two types of PLC's are_____
a. Fixed PLC
b. Modular PLC
c. Medium PLC
d. **Both a & b**

44. Digital Input of CPU is____
a. 12VDC
b. 230VAC
c. **24VDC**
d. 10VDC

45. PLC can be _____ in plant to change the sequence of operation.
a. only programmed
b. only reprogrammed
c. programmed and reprogrammed
d. able to give a set point

46. _____ of the following RLL applications is not normally performed in early automation systems?
a) On/off control of field devices
b) Logical control of discrete devices
c) On/off control of motor starters
d) Proportional control of field devices

47. Current flows into the _____
a) Input terminal of a sinking DC input module
b) Input terminal of a sinking output field device
c) Output terminal of a sinking input field device
d) All of the above

48. In a current sinking DC input module _____
a) The current flows out of the input field device
b) Requires that a AC sources be used with mechanical switches
c) The current flows out of the input module
d) Currents can flow in either direction at the input module

49. _____ one item in the input module circuit above should be changed to make it correct.
a) The battery polarity
b) Input module should be sinking
c) Field device should be sinking
d) Current flow direction

50. _____ contacts are actuated they disrupt the power supply through them.
a. normally open type
b. normally closed type
c. both a. and b.
d. none of the above

51. The type of memory which is fast and temporarily stores the data which are immediately required for use is called as_____.

a. HDD
c. RAM
b. ROM
d. SSD

52. The capability of convention relay systems for complex operations is ____ that of the PLCs.

a. poor than
c. as good as
b. excellent than
d. unpredictable as

53. _____ of PLCs can be done in very little time.

a. Programming
c. Commissioning
b. Installation
d. All of the above

54. PLC can be _____ in plant to change the sequence of operation.

a. only programmed
c. programmed and reprogrammed
b. only reprogrammed
d. able to give a set point

3. PLC programming and applications

Position in Question Paper **Total Marks-38**

Q.1. a) 2-Marks.
Q.1. b) 2-Marks
Q.2. b) 4-Marks
Q.3. c) 4-Marks
Q.4. b) 4-Marks.
Q.4. d) 4-Marks.
Q.5. b) 6-Marks.
Q.6. a) 6-Marks
Q.6. b) 6-Marks

Descriptive Question

1. Explain any one graphical languages of PLC

2. Explain functional block diagram in details.

3. State the Instruction set in ladder programming and explains.

4. Draw and Explain the format of ON –Delay timer with waveforms.

5. Draw the functional for OFF delay time and explain the functions.

6. Draw and Explain the format of up counter with waveforms.

7. Explain with waveforms down counter.

8. Explain MOV instruction of PLC.

9. What is Drum controller explain the application with suitable example.

10. List the different PLC programming languages .give one example of each.

11. Define Bits and words used in PLC.

MCQ Question

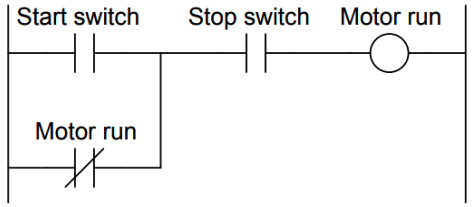
(Total number of Question=Marks*3=22*3=66)

Note: Correct answer is marked with **bold**

1. Ladder logic programming consists primarily of:
   (A) **Virtual relay contacts and coils**
   (B) Logic gate symbols with connecting lines
   (C) Function blocks with connecting lines
   (D) Text-based cod

2. In a PLC, the scan time refers to the amount of time in
   (A) the technician enters the program
   (B) timers and counters are indexed by
   (C) one "rung" of ladder logic takes to complete
   (D) **the entire program takes to execute**

3. Identify the problem in this motor control PLC program:



   (A) Coil
   (B) Start contact
   (C) **Seal-in contact**
   (D) Stop contact

4. The difference between online and offline PLC programming is
   (A) whether the PLC is running or stopped
   (B) whether the programming PC has internet connectivity
   (C) the type of programming cable used
   (D) **where the edited program resides**

5. In PLC programming, a retentive function is one that
   (A) Defaults to the "on" state
   (B) Comes last in the program
   (C) Defaults to the "off" state
   (D) **Is not reset after a power cycle**

6. _____ is the largest integer number that a PLC counter function can reach if it uses a 16 bit register?
   (A) 32,768
   (B) **65,535**
   (C) 65,536
   (D) 65,537

7. An OR function implemented in ladder logic uses
   (A) Normally-closed contacts in series
   (B) Normally-open contacts in series
   (C) A single normally-closed contact
   (D) **Normally-open contacts in parallel**

8. A good application for a timed interrupt in a PLC program would be
   (A) A communications function block
   (B) **A PID function block**
   (C) A math function block
   (D) A motor start/stop rung

9. Relay consisting of _____
   a) Only Coil Part
   b) Only Contact Part
   c) 3.**1 & 2 both**
   d) None of these

10. According to PLC device signal module has
   a) 1.3 parts
   b) 2.5 parts
   c) 3.**2 parts**
   d) 4. None of these

11. _____has known as the Father of PLC?
   a) Steve Jobs
   b) Bill Gates
   c) Dick Morley
   d) None of these

12. ____ is the name of the first PLC made by Bedford Associates of Bedford?
   a) MODICON-184
   b) MODICON-284
   c) MODICON-084
   d) None of these

13. The significance behind the product code "84" for the first PLC made by Bedford Associates?
   a) The year it was invented
   b) Number of attempts
   c) Number of persons worked for
   d) None of these

14. Relay consisting of _____
   a) Only Coil Part
   b) Only Contact Part
   c) 3.**1 & 2 both**
   d) None of these

15. The Programming line known as uses in LADDER Logic for PLC?
   a) Wrong
   b) Rung
   c) Right
   d) None of these

16. How many possible stages an input can have in LADDER Logic?
   a) Two
   b) One
   c) Three
   d) None of these

17. _____ do you mean by "NO" contact using for Input in LADDER Logic?
   a) Normally Operative
   b) **Normally Open**
   c) Not Operative
   d) None of these

18. _____ do you mean by "NC" contact using for Input in LADDER Logic?
   a) No Contact
   b) Normally Contact
   c) **Normally Close**
   d) None of these

19. _____ one of these is not a input type?
   a) Switch
   b) Sensor
   c) Motor
   d) 4.None of thes

20. Abbreviate PLC?
   a) Periodical Logical Control
   b) Program Logic Control
   c) **Programmable Logic Controller**
   d) None of these

21. Identify this address "255.255.0.1"?
   a. Ip address
   b. Subnet mask address
   c. cpu module address
   d. None of these

22. A Toggle Switch is a type_____.
   a) **Digital Device**
   b) Analog Device
   c) Both 1 & 2
   d) 4.None of these

23. Abbreviate DPST?
   a) Dual Pole Single Throw
   b) **Double Pole Single Throw**
   c) Double Pole Start Throw
   d) None of these

24. Which one of these is not a type of Toggle Switch?
   a) SPCO
   b) SPDT
   c) Flush
   d) 4.All of the above

25. A EMR (Relay) consist of_____.
   a) Coil Part
   b) Contact Part
   c) **Both Coil & Contac**t Part
   d) None of these

26. Abbreviate EMR (Relay)?
   a) **Electro Magnetic Relay**
   b) Electro Mechanical Relay
   c) Electro Motive Relay
   d) None of these

27. A Contactor consist of_____.
   a) Fix Part
   b) Moveable Part
   c) **Both Fix & Moveable Part**
   d) None of these

28. A Auxiliary Contactor_____.
   a) Increases the contact part
   b) Decreases the contact part
   c) Enhance the coil strength
   d) None of these

29. ___ is the meaning of "SR" flip flop?
   a) 1. System reset
   b) 2. Set range
   c) **Set-reset**
   d) None of these

30. In On-Delay Timer" delays turning on" means
   a) delaying the input to get activate
   b) delaying the output to get activate
   c) Both 1 & 2
   d) None of these

31. _____is mode normally present in the CPU module of the PLC unit?
   a) 1. RUN-Mode
   b) 3. **Both RUN & STOP Mode**
   c) STOP-Mode
   d) None of these

32. One cycle through the program in a PLC unit is called a
   a) 1. Period Time
   b) 3. Cycle Time
   c) **Scan Time**
   d) None of these

33. According to Module, How many most essential components are present in the PLC Unit?
a) 1. 3 c) 2. 5
b) 3. **4** d) None of these

34._____Considered as the brain of the PLC Unit.
a) Power Supply c) I/O Module
b) **CPU Module** d) None of these

35. Relay consisting of _____
a) Only Coil Part c) 3.**1 & 2 both**
b) Only Contact Part d) None of these

36. For larger PLC, normally the input cards contain_____numbers of input.
a) 1. 4 or 8 **c)** 8 or 16
b) 3. **16 or 32** d).None of these

37. _____ one of these in not a type of PLC?
a) 1. PAC c) RTU
b) 3. **OME** d) None of these

38. According to the module PLC categorizes into_____types.
a) 1. 4 c) 2
b) 3. **3** d) None of these

39. A typically small sized PLC contain_____Input/Output.
a) 1. 512 c) **500**
b) 3. 1024 d.) None of these

40. S7-300 normally called as_____sized PLC.
a) 1. Large c) Small
b) 3. **Medium** d) None of these

41. Can a Standalone PLC able to provide networking**?**
a) Yes c) **No**
b) 3. Cannot say d) None of these

42. Function Block Diagram (FBD) is a type of_____.
a) 1. **PLC Language** c. Block Diagram of a module
b) 3. Block Diagram of a PLC model d. None of these

43. STL stands for?
a) Serial Task Language
b) Statement List
c) Serially Transferring the Load-value
d) None of these

44**.** Abbreviate CP?
a. **Communication Processor**
b. Communication Peripheral
c. Communication Properties
d. None of these

45. _____ one of these is not a type of PLC Language?
a) 1. LAD c) FDB
b) 3. STL d) **None of these**

46. In "SM 323 DI 16/DO16*24Vdc" SM stands for?
a) 1. **Signal Module** c) Signal Mode
b) 3. Safe Mode d)None of these

47. In MOVE Block "EN" stands for?
a) Enable Block **c) Enable Input**
b) Enable output d) None of these

48. PLC can be _____ in plant to change the sequence of operation.
a) only programmed **c) programmed and reprogrammed**
b) only reprogrammed d) able to give a set point

49. Relay consisting of _____
a) Only Coil Part c) **1 & 2 both**
b) Only Contact Part d).None of these

50. According to PLC device signal module has
a) 1.3 parts **c)** 3.**2 parts**
b) 2.5 parts **d)** 4. None of these

51. _____has known as the Father of PLC?
a) Steve Jobs **c) Dick Morley**
b) Bill Gates d) None of these

52_____ one item in the input module circuit above should be changed to make it correct.
a) The battery polarity
b) Input module should be sinking
c) Field device should be sinking
d) Current flow direction

53. The PLC is used in _____.
a) machine tools c) moulding and extrusion machines
b) automated assembly equipment d) **all of the above**

54. Relay O/P modules are used to interface_____
a) DC load **c) Both a & b**
b) AC load d) None of the above

55. Depending on the size of I/O the main two types of PLC's are_____
a) Fixed PLC c) Medium PLC
b) Modular PLC **d) Both a & b**

56. Digital Input of CPU is____
a) 12VDC **c) 24VDC**
b) 230VAC d) 10VDC

57. PLC can be _____ in plant to change the sequence of operation.
a) only programmed c) **programmed and reprogrammed**
b) only reprogrammed d) able to give a set point

58. _____ of the following RLL applications is not normally performed in early automation systems?
a) On/off control of field devices
b) Logical control of discrete devices
c) On/off control of motor starters
d) Proportional control of field devices

59._____ of PLCs can be done in very little time**.**

a) Programming
b) Installation
c) Commissioning
d) All of the above

60. PLC can be _____ in plant to change the sequence of operation**.**

a) only programmed
b) only reprogrammed
c) programmed and reprogrammed
d) able to give a set point

61. The PLC is used in _____

a**)** machine tools
b**)** automated assembly equipment
c) moulding and extrusion machines
d) all of the above

62**.** _____of the following cannot be an input that is given to the PLC?

a) Manual switches
b) Relays
c) Sensors
d**) None of the above**

63 In a PLC, the scan time refers to the amount of time in

(a) the technician enters the program
(b) timers and counters are indexed by
(c) one "rung" of ladder logic takes to complete
(d) **the entire program takes to execute**

64. A Toggle Switch is a type_____.

a.**Digital Device**
b. Analog Device
c) Both 1 & 2
d) None of these

65. Abbreviate DPST?

a.Dual Pole Single Throw
b. **Double Pole Single Throw**
c) Double Pole Start Throw
d) None of these

66. _____ one of these is not a type of Toggle Switch?

a. SPCO
b. SPDT
c) Flush
d) All of the above

4. Electric Drives& Special Machines

Position in Question Paper **Total Marks-16**

Q.1. d) 2-Marks
Q.3. d) 4-Marks.
Q.4. e) 4-Marks
Q.5. c) 6-Marks.

Descriptive Question

1. List the functions of Electrical drives.
2. Draw a generalized block diagram of Electrical Drives and explain in brief.
3. Compare AC and DC drives on any four points.
4. Select device that can be used with PLC to control the speed of AC motor. Explain how?
5. List types of Electric drives.
6. Enlist different specifications of AC drives. (Any eight)
7. What are the types of drives?
8. Explain nature of load.
9. Draw the running characteristics of any 4 motors.
10. Compare AC & DC Drives.
11. State the types of controls for DC drives.
12. With the suitable diagram & waveforms explain operation of single phase fully controller. Rectifier.

MCQ Question

(Total number of Question=Marks*3=12*3=36)

Note: Correct answer is marked with **bold.**

1. Load torques can be classified into how many types?
   a) Three
   b) **Two**
   c) Four
   d) Five
2. _____is the relationship between torque and speed in constant type loads?
   a) **Torque is independent of speed**
   b) Torque linearly increases with increase in speed
   c) Torque non-linearly increases with an increase in speed
   d) Torque non-linearly decreases with an increase in speed
3. _____type of force handles for active torques?
   a) Strong nuclear forces
   b) Weak nuclear forces
   c) **Gravitational forces**
   d) Electrostatic forces
4. Among the following which one exhibits linearly rising load torque characteristics?
   a) Elevators
   b) Rolling Mills
   c) Fan load
   d) **Separately excited dc generator connected to the resistive load**
5. _____is the condition for the steady-state operation of the motor?
   a) Load torque > Motor torque
   b) Load torque <Motor torque
   c) **Load torque = Motor torque**
   d) Load torque < Motor torque
6. Regenerative braking mode can be achieved in which quadrant (V-I curve)?
   a) Third
   b) **Second**
   c) Fourth
   d) First
7. Type-A chopper is used for obtaining which type of mode?
   a) **Motoring mode**
   b) Regenerative braking mode
   c) Reverse motoring mode
   d) Reverse regenerative braking mode
8. Calculate the value of angular acceleration of motor using the given data: J = 20 kg-m^2, load torque = 20 N-m, motor torque = 60 N-m.
   a) **5 rad/s^2**
   b) 2 rad/s^2
   c) 3 rad/s^2
   d) 4 rad/s^2
9. 230V, 10A, 1500rpm DC separately excited motor having resistance of .2 ohm excited from external dc voltage source of 50V. Calculate the torque developed by the motor on full load.
   a) 13.89 N-m
   b) **14.52 N-m**
   c) 13.37 N-m
   d) 14.42 N-m
10. Boost converter is used to _____
    a) Step down the voltage
    b) **Step up the voltage**
    c) Equalize the voltage
    d) Step up and step down the voltage
11. _____one is an example of variable loss?
    a) Windage loss
    b) Hysteresis loss
    c) **Armature copper loss**
    d) Friction loss

12. The unit of the torque is _____
    a) **N-m**
    b) N-m^2
    c) N-m/sec
    d) N-Hz
13. Calculate the value of the torque when 10 N force is applied perpendicular to a 10 m length of rod fixed at the center.
    a) 200 N-m
    b) **300 N-m**
    c) 100 N-m
    d) 400 N-m
14. _____is the dimensional formula for torque?
    a) **[ML^2T^{-2}]**
    b) [MLT^{-2}]
    c) [$M^1L^2T^{-3}$]
    d) [LT^{-2}]
15. Buck converter is used to _____
    a) **Step down the voltage**
    b) Step up the voltage
    c) Equalize the voltage
    d) Step up and step down the voltage
16. The advantage of the double squirrel cage induction motor over a single cage rotor is that its _____
    a) Efficiency is higher
    b) Power factor is higher
    c) Slip is larger
    d) **Starting current is lower**
17. A 16-pole, 3-phase, 60 Hz induction motor is operating at a speed of 150 rpm. The frequency of the rotor current of the motor in Hz is _____
    a) 20
    b**) 40**
    c) 30
    d) 10
18. Calculate the amplitude of the sinusoidal waveform z(t)=715sin(165πt+2π÷468).
    a) 710
    b) **715**
    c) 716
    d) 718
19. The short circuit test on a 3-φ induction motor is conducted at a rotor speed of _____
    a) Zero
    b) < N_s
    c) > **N_s**
    d) N_s
20. If induction motor air gap power is 10 KW and mechanically developed power is 8 KW, then rotor ohmic loss will be _____ KW.
    a) 1
    b) **2**
    c) 3
    d) 4
21. The slope of the V-I curve is 39.1°. Calculate the value of resistance. Assume the relationship between voltage and current is a straight line.
    a) **.81 Ω**
    b) .36 Ω
    c) .75 Ω
    d) .84 Ω
22. The power factor of a squirrel cage induction motor is _____
    a) **Low at light load only**
    b) Low at heavy loads only
    c) Low at the light and heavy loads both
    d) Low at rate load only
23. Calculate the total heat dissipated in a resistor of 50 Ω when 1.4 A current flows through it.
    a) **98 W**
    b) 92 W
    c) 91 W
    d) 93 W
24. A particular current is made up of two components: a 10 A and a sine wave of peak value 14.14 A. The average value of current is _____
    a) Zero
    b) 24.14 A
    c) **10 A**
    d) 14.14 A
25. A 38-pole, 3-phase, 80 Hz induction motor is operating at a speed of 12 rpm. The frequency of the rotor current of the motor in Hz is _____
    a) 75.2
    b) **76.1**
    c) 79.2
    d) 79.6

26. Displacement is a _____ quantity.
    a) Scalar
    b) **Vector**
    c) Scalar and Vector
    d) Tensor
27. In DC chopper, the waveform for input and output voltages is respectively _____
    a) Discontinuous and Continuous
    b) **Continuous and Discontinuous**
    c) Both continuous
    d) Both discontinuous
28. A chopper behaves as a _____
    a) DC equivalent of AC switching device
    b) **DC equivalent of AC transformer**
    c) DC equivalent of AC relay
    d) AC equivalent of circuit breaker
29. A DC chopper feeds an RLE load. If the value of E is increased by 20%, the current ripple _____
    a) Increases by 20%
    b) decreases by 20%
    c) increases only 20%
    d) **remains the same**
30. The conduction loss versus device current characteristic of a power MOSFET is best approximated by
    a) Straight line
    b) Rectangular hyperbola
    c) **Parabola**
    d) Exponential decaying functions
31. The dead network does not have any _____
    a) Dependent source
    b) **Independent source**
    c) Resistor
    d) Capacitor
32. The length of phasor is _____
    a**) R.M.S**
    b) Average
    c) Peak to Peak
    d) Minimum
33. Calculate the value of the time period if the frequency of the signal is .001 Hz.
    a) **1000 sec**
    b) 2000 sec
    c) 5000 sec
    d) 1500 sec
34. Full form of SCIM.
    a) **Squirrel cage induction motor**
    b) Solid cage induction motor
    c) Square cage induction motor
    d) Squirrel cage inverter motor
35. Wound rotor induction motor has better _____ characteristics than Squirrel cage induction motor.
    a) **Starting**
    b) Running
    c) Modified
    d) Quasi-state
36. All circuits are always _____
    a) **Networks**
    b) Resistors
    c) Capacitors
    d) Inductors

5. Supervisory Control & Data Acquisition System

Position in Question Paper **Total Marks-16**

Q.1. c) 2-Marks
Q.3. d) 4-Marks.
Q.4. a) 4-Marks
Q.6. b) 6-Marks.

Descriptive Question

1. State applications of SCADA.
2. What are desirable properties of SCADA
3. Explain SCADA system architecture in detail.
4. List various functions of SCADA.
5. State the advantages & dis-advantages of SCADA system
6. Write a short note on Supervisory Control & Data Acquisition System.
7. Explain the various communication technologies used in SCADA Systems.
8. Compare PLC and SCADA system on any four points.
9. Describe the steps involve developing SCADA application for following system.

MCQ Question

(Total number of Question=Marks*3=12*3=36)

Note: Correct answer is marked with **bold.**

1. _____is the full form of SCADA?
   a) Supervisory Control and Document Acquisition
   b) **Supervisory Control and Data Acquisition**
   c) Supervisory Column and Data Assessment
   d) Supervisory Column and Data Assessment
2. DCS is a _____
   a) **Distributed Control System**
   b) Data Control System
   c) Data Column System
   d) Distributed Column System
3. The control in SCADA is _____
   a) Online control
   b) Direct control
   c) **Supervisory control**
   d) Automatic control
4. _____is SCADA?
   a) Software
   b**) Process**
   c) System
   d) Hardware
5. _____ did the SCADA start?
   a) 1980s
   b) 1990s
   c) 1970s
   d) **1960s**
6. ____ did Windows become the world standard operating system?
   a) 1980s
   b) **1990s**
   c) 1970s
   d) 1960s
7. _____ of the following is an example of the SCADA system?
   a) Emerson Delta V
   b) Honeywell Plant Scape
   c) Yokogawa CENTUM
   d) **Power Studio Deluxe**
8. How many levels are present in a complex SCADA system?
   a) 3 – levels
   b) 5 – levels
   c) **4 – levels**
   d) 6 – levels
9. _____ of the following is the heart of a SCADA system?
   a) PLC
   b) HMI
   c) Alarm task
   d**) I/O task**
10. The acronym DCS stands for
    A) Delta Console Services
    (B) **Distributed Control System**
    (C) Direct Cascade Sequencing
    (D) Differential Concentration Switch

11. In SCADA programming, a retentive function is one that
    (A) Defaults to the "on" state
    (B) Comes last in the program
    (C) Defaults to the "off" state
    (D) **Is not reset after a power cycle**
12. The basic components used in the field devices
    a. **Sensors** c. Motor
    b. Relay d. Both a & b
13. SCADA can be _____ in plant to change the sequence of operation**.**
    a. only programmed **c. programmed and reprogrammed**
    b. only reprogrammed **d.** able to give a set point
14. The SCADA is used in _____
    a. machine tools **c.** mounding and extrusion machines
    b. automated assembly equipment **d. all of the above**
15**.** _____of the following cannot be an input that is given to the PLC?
    a. Manual switches
    b. Relays
    c. Sensors
    d. None of the above
16. In a SCADA, the scan time refers to the amount of time in
    (a) the technician enters the program
    (b) timers and counters are indexed by
    (c) one "rung" of ladder logic takes to complete
    (d) **the entire program takes to execute**
17. A Toggle Switch is a type_____
    a. **Digital Device** c. Both 1 & 2
    b. Analog Device d. None of these
18. _____ Automation tools used in process
    a. **Fixed automation**
    b. Variable automation
    c. Programmable automation
    d. Both a & b
19. In Process control the basic objective is to_____ the value
    a. Regulate
    b. Control
    c. **Both a& b**
    d. Process
20. SCADA is more reliable than_____
    a. Switch c. **Relay**
    b. Motor d. Button
21._____ is the different modules of SCADA
    a. Input module c. **Both a & b**
    b. Power supply d. None of the above

22. Programming devices is used to communicate between___
    a. **User & SCADA**
    b. I/O & PLC
    c. HMI & PLC
    d. Power supply & PLC
23. Sinking & sourcing terms are depends on the direction of ____
    a. Voltage flow
    b. **Current flow**
    c. Supply flow
    d. Both a & b
24. Relay O/P modules are used to interface_____
    a. DC load
    b. AC load
    c. **Both a & b**
    d. None of the above
25. Depending on the size of I/O the main two types of PLC's are_____
    a. Fixed PLC
    b. Modular PLC
    c. Medium PLC
    d. **Both a & b**
26. Digital Input of CPU is____
    a. 12VDC
    b. 230VAC
    c. **24VDC**
    d. 10VDC
27. SCADA can be _____ in plant to change the sequence of operation.
    a. only programmed
    b. only reprogrammed
    c. programmed and reprogrammed
    d. able to give a set point
28. _____ of the following RLL applications is not normally performed in early automation systems?
    a) On/off control of field devices
    b) Logical control of discrete devices
    c) On/off control of motor starters
    d) Proportional control of field devices
29. Current flows into the _____
    a) Input terminal of a sinking DC input module
    b) Input terminal of a sinking output field device
    c) Output terminal of a sinking input field device
    d) All of the above
30. In a current sinking DC input module _____
    a) The current flows out of the input field device
    b) Requires that a AC sources be used with mechanical switches
    c) The current flows out of the input module
    d) Currents can flow in either direction at the input module
31. _____ one item in the input module circuit above should be changed to make it correct.
    a) The battery polarity
    b) Input module should be sinking
    c) Field device should be sinking
    d) Current flow direction
32. _____ contacts are actuated they disrupt the power supply through them.
    a. normally open type
    b. normally closed type
    c. both a. and b.
    d. none of the above

33. The type of memory which is fast and temporarily stores the data which are immediately required for use is called as_____.

a. HDD
c. RAM
b. ROM
d. SSD

34. The capability of convention relay systems for complex operations is ____ that of the SCADA.

a. poor than
c. as good as
b. excellent than
d. unpredictable as

35. _____ of SCADA can be done in very little time.

a. Programming
c. Commissioning
b. Installation
d. All of the above

36. SCADA can be _____ in plant to change the sequence of operation.

a. only programmed
c. programmed and reprogrammed
b. only reprogrammed
d. able to give a set point