PSN COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

DEPARTMENT OF MECHANICAL ENGINEERING

MULTIPLE CHOICE QUESTION BANK

Year/Semester: IV / VII

Academic Year: 2025 - 2026

Subject: ME607417 ROBOTICS AND MECHANICAL ACTUATORS

VISION AND MISSION OF THE INSTITUTE:

Institution Vision	To emerge as a pioneer institute inculcating engineering education, skills, research, values and ethics.	
Institution Mission	**IM-1**	To achieve greater heights of excellence in technical knowledge and skill development through innovative teaching and learning practices.
	IM-2	To develop the state of art infrastructure to meet the demands of technological revolution.
	IM-3	To improve and foster research in all dimensions for betterment of society.
	IM-4	To develop individual competencies to enhance innovation, employability and entrepreneurship among students.
	IM-5	To instil higher standards of discipline among students, inculcating ethical and moral values for societal harmony and peace.

VISION AND MISSION OF THE DEPARTMENT:

Department Vision	To emerge as a preeminent department to produce quality Mechanical Engineering Graduates to meet national and global needs.	
Department Mission	**DM-1**	To educate students to be creative, inquisitive, and innovative to become quality engineers and entrepreneurs.
	DM-2	To instill advanced knowledge with research capabilities for global careers and higher studies
	DM-3	To inculcate moral and ethical standards in life and career.

PSN COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

B.E. MECHANICAL ENGINEERING

Semester – V

(ACADEMIC YEAR: 2025 - 2026)

501026 EXPERIMENTAL AERODYNAMICS

Regulation –2022

MULTIPLE CHOICE QUESTION BANK

(Each question carries one mark)

Instructions: Choose the correct option (A / B / C / D)

1. Who is credited with formulating the Three Laws of Robotics?
   A) Alan Turing
   B) Isaac Newton
   C) Isaac Asimov
   D) Nikola Tesla
2. Which of the following best defines a robot according to standard robotics definitions?
   A) A machine that stores data
   B) A programmable machine capable of carrying out a complex series of actions automatically
   C) A computing system designed for high-speed data
   D) A telecommunication system for remote control
3. What does DOF stand for in robotics?
   A) Degree of Fluctuation
   B) Degree of Freedom
   C) Domain of Function
   D) Direction of Force
4. Which of the following is NOT a typical element of robotic systems?
   A) Sensor
   B) Manipulator
   C) Actuator
   D) Resistor
5. The term "compliance" in robotics refers to:
   A) Speed of movement
   B) Resistance to motion
   C) Flexibility under force
   D) Power consumption
6. Resolution in robotic systems refers to:
   A) The speed at which a robot completes tasks
   B) The ability to control position precisely
   C) The durability of the robotic arm
   D) The total length of the manipulator
7. What is the typical number of DOFs in a 6-axis industrial robotic arm?
   A) 3
   B) 4
   C) 5
   D) 6

8. Repeatability in robotics is best defined as:
   A) Ability to adapt to new tasks
   B) Ability to return to a position consistently
   C) Time taken to complete a task
   D) Torque output of the motor
9. The RCC device in robotics is used for:
   A) Actuator calibration
   B) End-effector compliance
   C) Motion control
   D) Reducing errors in sensors
10. Which of the following classifications is based on robot workspace?
   A) SCARA
   B) Delta
   C) Cylindrical
   D) All of the above
11. The first industrial robot was introduced in:
   A) 1935
   B) 1950
   C) 1961
   D) 1975
12. Which work volume shape is associated with a SCARA robot?
   A) Spherical
   B) Cylindrical
   C) Rectangular
   D) Planar
13. Dexterity of a robot refers to:
   A) Its strength
   B) Its cost
   C) Its ability to manipulate objects in confined spaces
   D) Its energy consumption
14. Which law of robotics states “A robot must obey the orders given by human beings”?
   A) First
   B) Second
   C) Third
   D) None
15. A robot with 3 rotational joints is often referred to as a:
   A) Cartesian robot
   B) Cylindrical robot
   C) Articulated robot
   D) SCARA robot
16. Which component defines the physical form of a robot?
   A) Processor
   B) Sensor
   C) Anatomy
   D) Software
17. What type of robot drive is known for high precision but low speed?
   A) Pneumatic
   B) Hydraulic
   C) Electric servo
   D) Manual
18. RCC stands for:
   A) Reactive Cartesian Control
   B) Remote Controlled Configuration
   C) Remote Center Compliance
   D) Robotic Calibration Component

19. Which parameter defines a robot's minimum measurable motion?
    A) Accuracy
    B) Repeatability
    C) Resolution
    D) Precision
20. In robot classification, Cartesian robots have which movement type?
    A) Polar
    B) Rotational
    C) Linear
    D) Hybrid
21. A cylindrical robot has movement in:
    A) X, Y, and Z only
    B) Linear + rotational (cylinder axis)
    C) Only linear
    D) Only rotational
22. Which of the following parameters is critical for welding robots?
    A) Dexterity
    B) Payload
    C) Repeatability
    D) Speed
23. The term "robot" is derived from a word in which language?
    A) Greek
    B) Czech
    C) Latin
    D) Russian
24. What limits the maximum load a robot arm can carry?
    A) Weight of the base
    B) Joint flexibility
    C) Payload capacity
    D) Processor type
25. Misunderstood robotic devices often refer to:
    A) Devices mistaken as robots
    B) Miswired systems
    C) Faulty control logic
    D) Poorly programmed systems
26. The classification "Articulated Robot" refers to robots with:
    A) Linear joint movement
    B) Multiple revolute joints
    C) Hydraulic actuation
    D) Single task capacity
27. Which of these is NOT a typical robot application?
    A) Painting
    B) Assembly
    C) Data compression
    D) Welding
28. Accuracy in robotics is defined as:
    A) Ability to repeat a task
    B) Proximity to intended target position
    C) Execution time
    D) Energy used
29. A robot designed for a repetitive fixed task is best classified under:
    A) Autonomous robot
    B) Service robot
    C) Hard automation
    D) Adaptive robot

30. In which domain are robots most widely used today?
    A) Medical surgery
    B) Industrial manufacturing
    C) Aerospace navigation
    D) Office automation
31. Which of the following is a mechanical type of gripper?
    A) Magnetic gripper
    B) Pneumatic finger gripper
    C) Suction cup
    D) Electroadhesive gripper
32. The purpose of a robotic gripper is to:
    A) Calculate the trajectory
    B) Control motion
    C) Hold and manipulate objects
    D) Measure velocity
33. Which gripper is most suitable for handling metallic sheets?
    A) Suction gripper
    B) Magnetic gripper
    C) Vacuum gripper
    D) Friction gripper
34. Force analysis of grippers is mainly done to:
    A) Determine actuator type
    B) Select sensor configuration
    C) Ensure object stability during manipulation
    D) Reduce energy consumption
35. Which of the following is not a type of sensor used in robotics?
    A) Tactile sensor
    B) Vision sensor
    C) Humidity sensor
    D) Torque sensor
36. A vision system in a robot helps in:
    A) Measuring temperature
    B) Enhancing gripper strength
    C) Detecting objects and guiding operations
    D) Communicating with humans
37. Tactile sensors in robotics are primarily used for:
    A) Identifying light intensity
    B) Measuring force and contact
    C) Reading barcode data
    D) Transmitting signals
38. The function of a force/torque sensor in a robotic arm is to:
    A) Calculate arm length
    B) Measure and control applied forces
    C) Increase arm velocity
    D) Regulate temperature

39. The use of proximity sensors in robotics is mainly for:
A) Measuring fluid levels
B) Detecting presence or absence of objects
C) Temperature control
D) Wireless communication

40. Piezoelectric sensors convert:
A) Light into voltage
B) Mechanical stress into electrical signals
C) Sound into mechanical energy
D) Electrical energy into sound

41. A capacitive sensor operates based on changes in:
A) Temperature
B) Capacitance
C) Current
D) Resistance

42. Which of the following sensors is best suited for measuring joint angles in robotic arms?
A) Force sensor
B) Ultrasonic sensor
C) Potentiometer
D) Infrared sensor

43. Infrared sensors are typically used in robotics for:
A) Thermal regulation
B) Speed monitoring
C) Obstacle detection
D) Trajectory planning

44. Optical encoders are used to measure:
A) Position and speed
B) Temperature
C) Load
D) Humidity

45. The selection of a sensor depends primarily on:
A) Robot size
B) Environmental conditions and task requirements
C) Material of the robot body
D) Actuator type

46. Which of the following is a contact-type sensor?
A) Ultrasonic sensor
B) LIDAR
C) Tactile sensor
D) Proximity sensor

47. A strain gauge sensor is used to measure:
A) Acceleration
B) Force or stress

C) Temperature
D) Pressure

48. In a robot vision system, the frame grabber is used for:
A) Capturing images from a camera
B) Compressing image files
C) Controlling motion
D) Storing commands

49. Binary sensors provide:
A) Continuous voltage output
B) Multilevel signals
C) Two-level (on/off) outputs
D) Sound signals

50. What type of gripper is best suited for delicate materials?
A) Magnetic
B) Pneumatic
C) Soft robotic gripper
D) Hydraulic

51. The term "end-effector" in robotics typically refers to:
A) A sensor
B) A display panel
C) A tool or gripper at the robot's wrist
D) A processor

52. Vision systems in robots are primarily implemented for:
A) Force feedback
B) Human interaction
C) Object recognition and tracking
D) Speed control

53. Which type of sensor is used in robotic navigation for mapping?
A) Tactile sensor
B) LIDAR
C) Thermistor
D) Reed switch

54. Sensor calibration is important to ensure:
A) Sensor aesthetics
B) Programming logic
C) Measurement accuracy
D) Material compatibility

55. The primary limitation of ultrasonic sensors is:
A) Power consumption
B) Inaccuracy in vacuum
C) Inability to detect color
D) Fragility

56. Which parameter is critical when selecting a gripper for an application?
A) Number of motors
B) Material color

C) Object geometry and weight
D) Battery capacity

57. Which sensor provides distance based on light reflection?
A) LVDT
B) Infrared sensor
C) Tactile sensor
D) Barometer

58. The simplest method to detect object presence is using:
A) Vision sensor
B) Proximity switch
C) Accelerometer
D) GPS

59. The term “sensor fusion” refers to:
A) Melting sensors
B) Using one sensor for all functions
C) Combining multiple sensor data for better decision-making
D) Creating new sensors

60. What kind of robotic gripper mimics the human hand’s functionality?
A) Claw gripper
B) Two-finger gripper
C) Anthropomorphic gripper
D) Magnetic gripper

61. Which of the following is a type of robotic drive system?
A) Optical
B) Thermal
C) Electric
D) Biochemical

62. Pneumatic drive systems are typically powered by:
A) Hydraulic oil
B) Compressed air
C) Electric current
D) Solar energy

63. A key advantage of hydraulic drives is:
A) Quiet operation
B) High precision
C) High power-to-weight ratio
D) Low cost

64. Which drive system is most suitable for precise control in small-scale robots?
A) Hydraulic
B) Pneumatic
C) Electric servo
D) Combustion engine

65. What type of transmission system uses chains or belts?
A) Direct drive
B) Gear drive

C) Flexible transmission
D) Rack and pinion

66. Which actuator is commonly used in pick-and-place robots for fast response?
A) Pneumatic actuator
B) Hydraulic actuator
C) Stepper motor
D) Combustion actuator

67. Which parameter is essential when selecting an actuator for a robotic joint?
A) Number of gears
B) Color of wires
C) Required torque and speed
D) Weight of the sensor

68. The function of a transmission system in robotics is to:
A) Provide vision feedback
B) Transmit power from actuator to end-effector
C) Increase electrical resistance
D) Cool the actuators

69. A stepper motor moves in:
A) Continuous rotation
B) Pulsed discrete steps
C) Oscillatory motion
D) Fluid-controlled direction

70. Which of the following is a rotary actuator?
A) Cylinder
B) Servo motor
C) Solenoid
D) Linear encoder

71. Closed-loop control systems provide:
A) Open responses
B) Feedback for error correction
C) High energy loss
D) Manual override only

72. Which of the following sensors is used in closed-loop feedback control for position?
A) Thermocouple
B) Encoder
C) Humidity sensor
D) pH sensor

73. The primary difference between open-loop and closed-loop systems is:
A) Power source
B) Material of links
C) Feedback mechanism
D) Drive type

74. In a DC motor control system, what is typically used for speed feedback?
A) Voltage regulator

B) Potentiometer
C) LED
D) Transistor

75. Torque control in actuators is important for:
A) Minimizing data loss
B) Preventing overheating
C) Accurate force application
D) Power saving

76. Which drive system offers smooth motion and better precision?
A) Pneumatic
B) Hydraulic
C) Stepper motor
D) Electric servo

77. Which of the following transmission systems converts rotary motion to linear motion?
A) Belt drive
B) Rack and pinion
C) Chain drive
D) Coupling

78. The purpose of gears in robotic joints is to:
A) Store electrical energy
B) Provide visual display
C) Alter torque and speed
D) Reduce circuit load

79. What is the most common drawback of hydraulic systems?
A) Low power
B) Slow response
C) Leakage and maintenance
D) Incompatibility with AI

80. A solenoid actuator produces:
A) Thermal energy
B) Rotary motion
C) Linear motion
D) Optical signal

81. What component is responsible for regulating voltage in actuator circuits?
A) Relay
B) Transistor
C) Voltage regulator
D) Encoder

82. The closed-loop control system continuously compares:
A) Actual output with desired input
B) Voltage with temperature
C) Drive torque with mass
D) Light intensity with battery level

83. Brushless DC motors are preferred in robotics because they:
A) Are cheap
B) Require frequent maintenance
C) Have no commutators and offer high efficiency
D) Produce high vibration

84. Which control strategy minimizes the error in real-time applications?
A) Feedforward only
B) Manual control
C) Feedback control
D) Open switching

85. Which of the following is not a component of a control system?
A) Actuator
B) Controller
C) Feedback
D) Monitor stand

86. In robotic actuation, hysteresis refers to:
A) Constant feedback
B) Energy recovery
C) Lag between input and output
D) High frequency response

87. Torque-speed characteristics are essential for choosing:
A) Controller ICs
B) Drive batteries
C) Robot joints and motors
D) Keyboard layout

88. The efficiency of gear-based transmission depends on:
A) Tooth design and material
B) Gripper type
C) Sensor size
D) Number of joints

89. An example of a linear actuator is:
A) DC motor
B) Pneumatic piston
C) Servo motor
D) Rotary encoder

90. In a PID control loop, the 'D' component refers to:
A) Delay
B) Derivative
C) Direct
D) Dynamic

91. In robot programming, the WAIT command is used to:
A) Pause until a condition is met
B) Initiate motion
C) Reset all subroutines
D) Cancel execution

92. The SIGNAL command is typically used to:
A) Turn off the system
B) Set an output or flag for another process
C) Delay a routine
D) Reboot the controller

93. The DELAY command performs what function?
A) Measures sensor output
B) Executes commands faster
C) Introduces a time pause
D) Generates output pulses

94. A subroutine in robot programming is:
A) A visual interface
B) A main program loop
C) A reusable block of code
D) An interrupt handler

95. The VAL programming language is:
A) A scripting language for mobile phones
B) A low-level assembly variant
C) A dedicated language for controlling robots
D) A language for image processing

96. The AML language was developed by:
A) ABB
B) KUKA
C) IBM
D) Mitsubishi

97. Which of the following is an open-source robotics middleware framework?
A) VAL
B) ROS
C) AML
D) RAPID

98. In robot programming, conditional statements are used to:
A) Set time intervals
B) Loop sensor data
C) Make decisions based on logic
D) Declare variables

99. Which language is most commonly used in academic robot simulations?
A) COBOL
B) BASIC
C) Python
D) Fortran

100. In ROS, a “node” refers to:
A) A sensor
B) A motor
C) An executable process
D) A data table

101. What is a key benefit of using ROS in robotics?
A) High memory usage
B) Proprietary limitations
C) Modular and scalable design
D) High cost

102. Which of the following best describes a robot “task-level” program?
A) Focuses on hardware control
B) Specifies low-level actuator logic
C) Describes high-level job operations
D) Controls transistor switching

103. What is the main function of a robot control loop?
A) Repeat visual commands
B) Monitor and adjust motion continuously
C) Switch power
D) Handle file storage

104. An example of an event-based command in robotics is:
A) DELAY
B) START
C) SIGNAL
D) REPEAT

105. Python is preferred for robotic simulation because:
A) It is a low-level language
B) It does not support libraries
C) It is easy to read and integrates well with ROS
D) It runs only on Linux

106. In ROS, topics are used for:
A) Decision making
B) Signal generation
C) Inter-process communication
D) Memory cleanup

107. A programming loop is essential for:
A) Initializing sensors
B) Repeating tasks
C) Designing grippers
D) Assembling hardware

108. Which of the following is NOT a feature of robot programming languages?
A) Interrupt handling
B) Trajectory planning
C) Statistical regression
D) Motion control

109. A structured robot program includes:
A) Randomly executed instructions
B) Only hardware logic
C) Initialization, execution, and termination blocks
D) Machine learning scripts only

110. A typical ROS launch file uses what format?
A) JSON
B) XML
C) HTML
D) CSV

111. AML stands for:
A) Automated Machine Language
B) A Manufacturing Language
C) Adaptive Motion Logic
D) Algorithmic Motion Link

112. In Python, libraries commonly used in robotics include:
A) pandas, numpy, matplotlib
B) keras, sklearn
C) opencv, rospy
D) tkinter, django

113. Which robot programming method is based on teaching by demonstration?
A) Lead-through
B) Offline coding
C) Manual coding
D) Object-based programming

114. In robot programming, which of the following handles exception routines?
A) SIGNAL
B) WAIT
C) ERROR or TRY-CATCH
D) START

115. A program loop that never ends is referred to as:
A) Dead loop
B) Infinite loop
C) Nested routine
D) Binary sequence

116. The primary advantage of subroutines is:
A) Decrease in code size and reuse
B) Graphical programming
C) Increase in processing power
D) Only hardware control

117. Which ROS tool visualizes robot models and sensor data?
A) rviz
B) plotJuggler
C) moveit
D) opencv

118. Which keyword in Python is used to define a function?
A) def
B) function
C) start
D) sub

119. In ROS, what command is used to initialize a node?
A) rosnode create
B) rosrun node
C) rospy.init_node()
D) start_node

120. Which robot programming language is known for its simplicity and widespread use in industry?
A) AML
B) RAPID
C) VAL
D) Python

121. UAV stands for:
A) Universal Aerial Vehicle
B) Unmanned Autonomous Vehicle
C) Unmanned Aerial Vehicle
D) Unified Aero Vehicle

122. Which of the following is a primary application of UAVs?
A) Underwater surveillance
B) Tunnel drilling
C) Aerial mapping and surveillance
D) Ground transportation

123. Fixed-wing UAVs are characterized by:
A) Vertical take-off
B) Hovering stability
C) Long flight range and endurance
D) High payload for short distance

124. Multi-copter UAVs are best suited for:
A) Long-range delivery
B) High-speed racing
C) Hovering and vertical lift
D) Submarine communication

125. Which component provides lift in a fixed-wing UAV?
A) Rotor blades
B) Ducted fans
C) Wings
D) Wheels

126. UAVs are classified based on:
A) Color
B) Type of material
C) Wing configuration and propulsion system
D) Fuel type only

127. A flapping wing UAV mimics the flight of:
A) Helicopter
B) Jet

C) Bird or insect
D) Glider

128. Swarm robotics in UAVs refers to:
A) High-speed drones
B) Multiple UAVs coordinating autonomously
C) UAVs with loud sound
D) Artificial insect bots

129. Which is a major advantage of swarm UAVs?
A) Lower flight speed
B) Independent operation
C) Collective decision-making and redundancy
D) Heavy payload

130. A UAV designed for disaster response must prioritize:
A) Long-term hovering
B) Durability and autonomous navigation
C) Water resistance
D) Dual motors

131. UAVs are most commonly used in agriculture for:
A) Ground tilling
B) Plant breeding
C) Remote sensing and crop monitoring
D) Soil excavation

132. Which sensor is essential for UAV navigation?
A) Thermocouple
B) GPS
C) Proximity sensor
D) LIDAR

133. Payload in a UAV refers to:
A) Battery
B) Structural weight
C) Equipment carried for the mission
D) Propeller mass

134. Which of these UAVs can perform vertical take-off and landing?
A) Jet-powered UAVs
B) Flapping-wing UAVs
C) Multi-copter UAVs
D) Fixed-wing UAVs

135. A UAV's flight endurance is mainly limited by:
A) Altitude
B) Payload
C) Battery/fuel capacity
D) Motor size

136. Remote sensing by UAV involves:
A) Direct contact measurements
B) Sensor-based data acquisition from a distance

C) High-pressure scanning
D) Radio signal jamming

137. Which part of UAV handles the directional control?
A) Propeller
B) Rudder/elevator
C) Battery
D) Winglet

138. A fixed-wing UAV typically requires:
A) No propulsion system
B) A long runway for takeoff
C) Vertical launch pad
D) A launcher drone

139. Which of the following is a challenge in multi-copter UAVs?
A) Stability
B) Short flight duration
C) Overheating propellers
D) Low thrust-to-weight ratio

140. In aerial surveillance, UAVs are preferred because of:
A) Low speed
B) High noise
C) Rapid deployment and mobility
D) Need for multiple operators

141. Swarm UAVs typically communicate through:
A) Ultrasonic waves
B) Swarm neural links
C) Wireless networks and protocols
D) Hardwired systems

142. What kind of UAV is best suited for forest fire monitoring?
A) Fixed-wing
B) Multi-copter with thermal imaging
C) Flapping-wing
D) Subterranean drone

143. UAVs used for search and rescue are often equipped with:
A) Solar panels
B) Cameras, GPS, and infrared sensors
C) Loudspeakers
D) Painting tools

144. UAV taxonomy refers to:
A) Genetic classification of drones
B) Systematic classification based on structure and usage
C) Biological application of UAVs
D) Thermal signature classification

145. Which UAV type is least suited for hovering in place?
A) Multi-copter
B) Hybrid VTOL

C) Fixed-wing
D) Flapping-wing

146. What is the key advantage of flapping-wing UAVs?
A) Battery life
B) Camouflage and agility in confined spaces
C) Payload capacity
D) Vibration resistance

147. The onboard controller in UAVs is responsible for:
A) Fuel efficiency
B) Manual override
C) Navigation, stability, and feedback control
D) Launch and recovery

148. Vertical Take-off and Landing (VTOL) is a feature of:
A) Fixed-wing aircraft
B) Gliders
C) Hybrid drones and multi-copters
D) Submarine UAVs

149. UAV communication with base station uses:
A) Optical cables
B) RF (Radio Frequency) signals
C) Compressed air pulses
D) Direct wiring

150. Which is a key safety concern in UAV operations?
A) Rotor color
B) Operator name
C) Mid-air collision and power loss
D) Paint texture

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Semester – V
(ACADEMIC YEAR: 2023 - 2024)
501026 EXPERIMENTAL AERODYNAMICS
Regulation –2018

MULTIPLE CHOICE QUESTION BANK

Answer:

Q. No	Ans	Q. No	Ans	Q. No	Ans	Q. No	Ans	Q. No	Ans
1	C	31	B	61	C	91	A	121	C
2	B	32	C	62	B	92	B	122	C
3	B	33	B	63	C	93	C	123	C
4	D	34	C	64	C	94	C	124	C
5	C	35	C	65	C	95	C	125	C
6	B	36	C	66	A	96	C	126	C
7	D	37	B	67	C	97	B	127	C
8	B	38	B	68	B	98	C	128	B
9	B	39	B	69	B	99	C	129	C
10	D	40	B	70	B	100	C	130	B
11	C	41	B	71	B	101	C	131	C
12	B	42	C	72	B	102	C	132	B
13	C	43	C	73	C	103	B	133	C
14	B	44	A	74	B	104	C	134	C
15	C	45	B	75	C	105	C	135	C
16	C	46	C	76	D	106	C	136	B
17	C	47	B	77	B	107	B	137	B
18	C	48	A	78	C	108	C	138	B
19	C	49	C	79	C	109	C	139	B

20	C	50	C	80	C	110	B	140	C
21	B	51	C	81	C	111	B	141	C
22	C	52	C	82	A	112	C	142	B
23	B	53	B	83	C	113	A	143	B
24	C	54	C	84	C	114	C	144	B
25	A	55	B	85	D	115	B	145	C
26	B	56	C	86	C	116	A	146	B
27	C	57	B	87	C	117	A	147	C
28	B	58	B	88	A	118	A	148	C
29	C	59	C	89	B	119	C	149	B
30	B	60	C	90	B	120	D	150	C