Question Bank (I-scheme)

Name of subject: Emerging Trend in Mechanical Engg.
Unit Test: I Subject code: 22652 Course:ME6I Semester: VI

Chapter 1: Recent Trend in Automobile Industry

2 marks questions

1.1 HYBRID CAR MANUFACTURERS

1. The fuel efficiency of Mild hybrids vehicle is more as compared to conventional hybrid systems by _____%?a) 10- 15%

b) 7-15%

c) 3-15%

d) 1-15%

2. Which voltage is likely to be available from the battery of an electric vehicle also known as Mildhybrid?

a) 12V

b) 24V

c) 300V

d) 100V

3. The MHEV system consists of which volt?

a) 12V

b) 24V

c) 48V

d) none of the above.

4. world's first commercially mass-produced and marketed hybrid automobile was the ToyotaPrius. It became available on the Japanese market in what year?

A 1998

B. 1996

C. 1997

D 1999

5. Hybrid vehicles convert energy that is normally lost through braking into electrical energy.What is the term that is used for this recycling of energy?

A Perpetual motion

B Regenerative breaking

C. Kinetic conversation

D. Hybrid archamy

6. First mass produced hybrid vehicle internationally is.....

1) Tesla model X.

2) Mahindra e2o.

3) Toyota Prius.

4) Ford GT.

7. The first vehicle with hybrid technology was developed by.....

1) Ferdinand Porsche.

2) Thomas Edison.

3) Isaac Newton.

4) Alexander Graham Bell.

8. Which of the following is not an advantage of hybrid vehicles.

1) Environmentally friendly.

2) Initial cost is low.

3) Better mileage.

4) Higher energy conservation.

9. Which of the following is not a disadvantage of hybrid vehicles?

1) You will not get as many discounts or incentives as you will get with electric vehicles.

2) They aren't as powerful.

3) <u>Lower mileage and higher emissions.</u>

4) They are not exempted from tax.

10. Which of the following is not the type of hybrid vehicle?

a) Plug in hybrid
b) Parallel hybrid
c) Natural gas for vehicle
d) Series hybrid

11. Regenerative braking involves :

a) Nano fibers that repair the surface of brake pads
b) Reducing the amount of friction
c) Reclaiming heat from the brake and using it for power
d) All of the above

12. What purpose does a generator serve in a hybrid vehicle?

(a) It converts nuclear energy 6more nuclear energy.
(b) It converts mechanical energy into electrical energy.
(c) It converts chemical energy into electrical energy.
(d) It converts electrical energy into mechanical energy.

13. _____ technology helps to stop a combustion engine when the vehicle pulls to a stop andrestart it when driver accelerates.

- Start stop technology
- Passive braking technology
- **Regenerative braking technology**
- Internal cooling technology

14. _____what does MHEV stands for

- **Mild hybrid electric vehicle**
- Micro hybrid electric vehicle
- Mild horsepower electric vehicle
- Micro horsepower electric vehicle

15. The electric motor in hybrid car can also act as_____

- **A generator**
- A Fuel pump
- Cooling fan
- Compressor

16. The full form of the BAHV's.

A) Battery assisted hybrid vehicle.
B) Battery proxy hybrid vehicle.
C) Battery assist hydro vehicle.
D) Nonn off the above.

17. The BAS mild hybrid system used….....To start the internal combustion engine.

a. Belt drive
b. Chain drive
c. Direct drive
d. None of the above.

18. The electric motor in a mild hybrid is acting as a

a. Power booster
b. Hydro boost
c. Buffalo power booster
d. Booster plug

19. I<u>n</u>_____ vehicle energy is stored in an auxiliary battery and then it is used to quickly starta vehicle

a) Full hybrid **b) Micro hybrid**
c) Series hybrid d) Mild hybrid

20. In which vehicle system lowest size of a battery is used

a**) Micro hybrid** b) Mild hybrid

c) Series hybrid d) Parallel hybrid

7. In which vehicle system bigger size of a battery is used

a) Micro hybrid b) Mild hybrid

c) Series hybrid **d) Full hybrid**

21. Following is not type of hybrid electric vehicle.

A) Series

B) Parallel

C) Vertical

D) Complex

22. In parallel hybrid vehicle Internal Combustion Engine and electric motor are coupled by a ……..device.

a. Hydraulic

b. Pneumatic

c. Mechanical

d. Electric

23. The combustion engine can operate in..... RPM range, even as a car change a speed.

a. Moderate

b. Wide

c. Narrow

d. None of the above

24. In this configuration, efforts are made to operate the electric motor alone at ..... and ICE alone at.....

a) medium speed and lower speed.

b) higher speed and lower speed

c) higher speed and medium speed

d) lower speed and higher speed

25. Full form of CVT

a) continuously variation transform

b) continue various transmission

c) continuously various transformation

d) continuously variable transmission

26. Full form of ICE

a) Internal continuous engine

b) Internal combination engine

c) internal continue emission

d) none of the above

27. Full form of PEM in fuel cell

a) petrol-exchange membrane

b) proton-execute membrane

c) proton-exchange membrane

d) petrol-execute membrane

28. Which vehicles do not require the same level of battery power and do not achieve the same levelsof fuel economy

a) Mild Hybrid

b) Full Hybrid

c) Series Hybrid
d) Parallel Hybrid

29. What does PHEV stands for
a) Plug-in Hybrid Electronic Vehicles
b) Plug-in Hybrid Electric Vehicles
c) Plug-out Hybrid Electronic Vehicles
d) Plug-out Hybrid Electric Vehicles

30. Which of these is the purpose of power-split device
a) To split Electrical Energy into Mechanical Energy.
b) To allow both the engine and Electric motor to propel the vehicle
c) To recharge the battery while braking
d) To recharge the brakes while driving

31. A Hybrid Vehicle equipped with push button start will enter the power ON mode but will notenter the ready to drive mode .No diagnostic trouble code are stored this could cause by
a) The high voltage safety plug is removed
b) A failed brake on/off switch
c) An empty fuel tank
d) A disconnect 12v battery

32. The MIL is illuminated and a battery module deterioration diagnostic trouble code is stored themost like cause is a failed by
a) High voltage battery
b) High voltage inverter
c) Motor/ generator
d) DC/ DC converter

33. A conventional vehicle costs 10 to 15 percent per mile in fuel to operate. How much does anelectric vehicle cost per mile?

- **2 to 4 cents**
- 5 to 6 cents
- 7 to 8 cents
- 9 to 10 cents

34. The strategic petroleum reserve was created to lower oil prices during supply disruptions .Howmuch did the US spend to build and fill the SPR?

- $980 billion
- $2 million
- $4.5 billion
- **$22 billion**

35. Current levels of off-peak electric capacity are sufficient to power how much of our nations carand light-duty truck fleet?

- 19%
- 33%
- 55%
- **73%**

36. Which of these is the purpose of the power-split device?

- To split electrical energy into mechanical energy
- **To allow both the engine and electric motor to propel the vehicle**
- To recharge the battery while braking

37. The electric cars available in india are:A . Hyndai Kona Electic
B. Mahindra E20
C . Tata tigor EV 2019
D. All of the above

38. The following companies have launched electric motor cycles in india :
A . revolt
B . hero

C . Yamaha
D . all of the above
39. India’s first electric bus was launched in ..... n 2014.
A . Chennai B . Mumbai C . Gujarat **D . Banglore**
40. Ashok Leyland launched its electric bus in.....
A . oct 2015 **B . oct 2016** C . april 2016 D . april 2015

1.2 E- Vehical

43.What type of battery is used in an electric car?

A] Lithium ion
B] Nickel -metal hydride
C] Both A and B
D] None of the above

44. The capacity of a battery is expressed in terms of

A ampere per hour
B current
C volt
D ampere

45. Life of a battery in the electric vehicle is about

A 8 years
B 5 years
C 10 years
D 20 years

46. Who was the inventor of electric batteries in electric cars

A Thomas Davenport
B newton
C Dr Abdul kalam
D Nikola tesla

47. How much time it takes for a electric car of 60kWh battery to charge

1. 5 hours
2. **8 hours**
3. 6-7 hours
4. None of above

48. Advantages of lithium batteries

1. Light weight
2. Compact
3. Low maintenance
4. **All of the above**

49. How many volts it take to charge an electric car?

1. 140
2. 150
3. **120**
4. 200

50. How many known modes of charging of EVs are available

1. 3
2. 2
3. **4**
4. 1

51. Which from the listed are fuel cells

1. SOFC
2. MCFC

3. PAFC
4. **ALL OF THE ABOVE**

52. Modern lithium ion batteries provide average range of
- 120-280 kilometres
- **320-480 kilometres**
- 520-680 kilometres
- 720-980 kilometres

53. The electrolyte used in sodium nickel chloride batteries is
- Sodium chloride
- **Tetra chloraluminate**
- Sodium bicarbonate
- Sodium glutamate

54. Average temperature of electrolyte in sodium nickel chloride batteries
- 100 to 200 degree Celsius
- **270 to 350 degree Celsius**
- 380 to 410 degree Celsius
- None of the above

55. Average lifespan of sodium nickel chloride batteries
- 5 years
- 10 years
- **15 years**
- 20 years

56. Sodium nickel chloride batteries are also called as
- Horse
- **Zebra**
- Cobra
- Turbo

57. Sodium sulphur battery is a type of molten-salt battery constructed from_____sodium andsulphur.
- Solid
- **Liquid**
- Plasma
- Gases

58. The following is the operating temperatures of the sodium –sulphur battery.
- 400 to 600°C
- 1000 to 1500°C
- **300 to 350°C**
- 100 to 200°C

59. The cell is usually_____in shape.
- Triangular
- Circular
- Rectangular
- **Cylindrical**

60. Entire cell is enclosed by a steel casing that is protected usually by_____and_____.
- Nickel, chromium
- **Chromium, molybdenum**
- Aluminium, molybdenum
- Nickel, aluminium

61. Full form of BASE is_____.
- Basic Analysis and Security Engine.
- Biefield Academic Search Engine.
- Basel Agency for Sustainable Energy.

- **Beta-Aluminium Solid Electrolyte.**

62. The sulphur in sulphur sodium battery is absorbed by____sponge.

- Sodium
- **Carbon**
- Wire
- Cellulose

63. Which of the following is not the name of charging station?

- Electric vehicle charging station
- EVSE
- ECS
- **ESSV**

64. The charging time depends on which of the following factor?

- Battery size
- **Battery capacity**
- Size of vehicle
- Voltage of batery

65. The capacity of a battery is expressed in terms of

A. Current rating
B. Voltage rating
C. Ampere hour rating
D. None of the above

66. The storage battery generally used in electric power station is

A. Nickel-cadmium battery
B. Zinc carbon battery
C. Lead-acid battery
D. None of the above

67. Trickle charger of a storage battery helps to

A. Maintain proper electrolyte level
B. Increase its reverse capacity
C. Prevent sulphation
D. Keep it fresh and fully charged

68. To prevent local action in battery, only .....is used in electrolytes

A. Pump water
B. Distilled water
C. Tap water
D. Both A and C

69. Ampere hour capacity of an industrial battery is based on .....hours discharge rate

A. 8
B. 12
C. 16
D. 24

70. Lithium cells operates ranging
froma. -25 ° C to 25 ° C
b. -50 ° C to 25 ° C
c. -50 ° C to 75 ° C
d. -75 ° C to 75 ° C

71. The positive plates of nickel iron cell is made up of
a. Nickel hydroxide
b. Lead peroxide
c. Ferrous hydroxide
d. Potassium hydroxide

72. In lead acid accumulators, the container is filled with distilled water and concentrated sulphuricacid in the ratio of

a. 1 : 2
b. 2 : 1
c. 3 : 1
d. 1 : 3

73. The emf of the dry cell is about
a. 0 V
b. 0.5 V
c. 1 V
d. 1.5 V

74. Which of the following battery is used for aircraft?
A. Lead acid battery
B. Nickel-iron battery
C. Dry cell battery
D. Silver oxide battery

75. When two batteries are connected in parallel, it should be ensured that
A. They have same emf
B. They have same make
C. They have same ampere hour capacity
D. They have identical internal resistance

76. The electrode for a battery must be
A. A semi conductor
B. An insulator
C. A good conductor of electricity
D. A bad conductor of electricity

77. Each cell has a vent cap
A. To allow gases out when the cell is on charge
B. To add water to the cell if needed
C. To check the level of electrolyte
D. To do all above functions

78. What is one of the primary downsides of fuel cells?
A. Weight
B. Cost
C. Pollution
D. Maintenance

79. A fuel cells converts ……energy into electrical energy
A. Mechanical
B. Magnetic
C. Solar
D. Chemical

80. Which of the following primary cells has the highest voltage ?
A. Manganese-alkaline
B. Carbon-zinc
C. Lithium
D. Mercury

81. Which of these is a problem electric car makers are trying to solve?
A. Electric cars aren't noisy enough.
B. They don't produce enough sulphur dioxides.
C. They don't cost enough.

82. Identify incorrect statement of Electric vehicle
A. Insufficient charging stations
B. Long charging period
C. Limited range
D. High operating cost

83. Which vehicle has the smallest number of principle components?
A. Traditional vehicle

B. Hybrid vehicle
C. Electric vehicle
D. Both A and B

84. Which of the following vehicles produces zero emissions?
A. Traditional
B. Hybrid
C. Electric
D. Both A and B

85. How long does an electric car battery lasts per charge?A. 20 min.-10hr. **B. 30min.-12hr.**
C. 40min.-9hr. D. 60min.-8hr.

86. What is the life span of electric car batteries?
A. 8 Year B. 10 years.
C. 9 years D. 11 years.

87. Which electric vehicle has 30 kwh and 160 km range?
A. **Nissan leaf** B. Ford focus
C. Mitsubishi MiE5 D. Smart ED

88. Which is the modified form of batteries in today's electronic cars?
A. Lithium ion B. Nickel iron
C. Lead Acid D. Sodium Nitrate

89. How to increase the range on electric vehicles?
a. By increasing the battery capacity.
b. By reducing battery capacity.
c. By installing a turbocharger.
d. By installing another DC motor.

90. Inverter cell anode and cathode of the .....cell is used for vehicle
(a) Copper electrode zinc
(b) Zinc copper
(c) Aluminium zinc
(d) Nickel Cobalt

1.3 Safety in Automobile

91. By what percentage do seatbelts reduce the risk of death for a person sitting in front seat?a) 40%
b) 50%
c) 60%
d) 70%

92. Where do typical car seat belts apply most of the stopping force?
a) To the shoulder and hips
b) To the chest and abdomen
c) To the rib cage and pelvis
d) To the head and legs

93. What area of car is designed to deform in a collision?
a) The crumple zone
b) The interior
c) The doors
d) The rear end

94. What's the primary advantage of a anti- lock braking system
a) They allow you to stop easier
b) They prevent locking
c) They allow you to steer while braking

95. Tempered safety glass is how many times stronger than regular glass
a) 1 to 3 times stronger
b) 5 to 10 times stronger

c) 3 to 5 times stronger
d) 1 to 2 times stronger

96. By what percentage can airbags reduce the risk of dying in a direct frontal crash?

a) 30%
b) 40%
c) 50%
d) 60%

97. What kind of gas inflates in an airbag

a) Hydrogen
b) Oxygen
c) Helium
d) Nitrogen

98. How far behind the steering wheel should you sit to avoid injury from an inflated airbag?

a) 8 inches
b) 5 inches
c) 10 inches
d) 13 inches

99. What are the requirements for a child to sit in a forward facing child seat?

a) He or she should weigh 10 to 15 pounds
b) He or she should weigh 13 to 15 pounds
c) He or she should weigh 15 to 18 pounds
d) He or she should weigh 20 pounds or more

100. When is a child ready to use an adult seat belt?

a) When they're around 4 feet,9 inches tall
b) When they're around 3 feet,5 inches tall
c) When they're around 4 feet,5 inches tall
d) When they're around 3 feet,9 inches tall

101. What does airbag, used for safety of car driver, contain?

A. Sodium bicarbonate
B. Sodium azide
C. Sodium nitrite
D. Sodium peroxide

102. What year did the government mandate driver's side airbags?A. 1989
B. **1996**
C. 2001
D. The government has never mandated it.

103. Cruise control is used in which vehicles

A Road vehicles
B water vehicles
C aeroplane
D bus

104. Adaptive cruise control is used to adjust _of vehicle

A speed
B direction
C magnitude
D light

105. Adaptive cruise control system uses _

A all of the below
Blaser sensor
C radar sensor
D camera setup

106. Autonomous cruise control are considered a _ car

A level 1
B level 2
C Level 3
D level 4

107. _____Introduced laser 'preview distance control'

A Mitsubishi Diamante
B BMW
C Toyota
D Mercedes

108. Toyota offered a_____cruise control

A lazer B radar C camera D all of the above

109. What was based system do not detect and dark vehicles in adverse weather

A laser B cameraC phone D laptop

128. If the impulse response in absolutely integrate then the system is

(a) Absolutely stable
(b) Unstable
(C) Linear
(d) Stable

129. Asymptotic stability is connected with:

(a) A system under influence of input.
(b) A system not under influence of input.
(c) A system under influence of input.
(d) A system not under influence out.

130. If root of the characteristics equation has positive real part system is

(a) Stable
(b) Unstable
(C) Marginally stable
(d) Linear

131. _____is a quantitative measure of how fair the transients die cut in the system.

(a) Absolutely stable
(b) Conditionally stable
(c) Unstable
(d) Relative stability

132. A controller essentially is a

A. Sensor
B. Clipper
C. Comparator
D. Amplifier

133. When brakes are applied on a moving vehicle the kinetic energy is converted to

A. Mechanical energy
B. Heat energy
C. Electrical energy
D. Potential energy

134. The force required to stop a vehicle is dependent on

A. The weight of vehicle
B. The declaration rate
C. Both A and B
D. None of the above

135. Handbrake is applicable to

A. Only front wheels
B. Only rear wheels

C. Both front and rear wheel.

D. All of the above.

136. The power brake may be exerted by

A. Electrical energy

B. Engine vacuum

C. Air pressure

D. All of the above

137. What does air bags, used for safety of car driver contain?

1.sodium bicarbonate.

2.sodium zide

3.sodium itrate

4.sodium peroxide

138. Which country first use in air bags for aerospace industry.

1.Iindia

2.U.S

3. China.

4.Pakistan

139. Which spacecraft landing first use in air bags.

1.luna 9 and Luna 13.

2.luna 10 and luna 12

3.luna 11 and luna 4

4.luna 16 and luna 18

140. First used in pedestrian air bags.

1. Volvo v50

2. Volvo v60

3.volvo v40.

4. Volvo v70

141. Who invented air bags in Japan.

1.Yasuzaburou kanka.

2. Yasuzaburou kobori

3. Varun Khatri.

4. Saurabh zombie

142. The time between the collision of two aircraft on a collision course is called_____

a) Differential time **b) Tau**

c) Traffic Time d) Collision Time 143.What is the surveillance range of a general TCS system?

a) 30 sec b) 20min

c) 2 min **d) 4 min**

144. Anti-collision system is also known as _____

a) Collision Avoidance System b) Pre-crash System

c) Collision Mitigation system d) Forward collision warning system

e) All of the above

145. In India, Autonomous Emergency Braking system (AEB) could become mandatory on new cars by ___

a) 2020 b) 2024

c) 2022 d) 2026

146. A 2015 study based on European and Australasian data suggests the AEB can decrease rear end collisions by_____%

a) 40%. **b) 38%**

c) 24%. d) 56%

147. What is adaptive cruise control?

1. **Adaptive cruise control is a safety and comfort providing technology in automobile**
2. Adaptive cruise control is automatic car driving technology
3. Adaptive cruise control is fast car driving technology
4. Adaptive cruise control is slow car driving technology

148. When was cruise control invented?1. 1945
2. 1948
3. 1952
4. 1961

149. Purpose of inventing Adaptive cruise control?
1. To reduce accident
2. To increase efficiency of automobile
3. To increase driving comfort
4. To invent new driving technology

150. Demerits of Adaptive cruise control?
1. System may fail
2. This system do not work on wet surface well
3. Not effective in bad weather
4. All of the above

151. Major components of Adaptive cruise control?
1. Radar sensor
2. ACC buttons on the steering wheel
3. Multi-information display
4. All of the above

152. Where is the ACC system most effective?
1. In traffic conditions
2. High ways
3. Hills
4. Wet and slippery surface 153.The following is not a drum brake
(A) External contracting brake
(B) Internal expanding brake
(C) Disc brake
(D) All of the above

154. In disc brake, the disc is attached to the
(A) wheel
(B) axle
(C) suspension system
(D) none of the above

155. The mechanical brakes are operated by means of
(A) levers
(B) bell cranks
(C) cams
(D) all of the above

156. Hydraulic brakes function on the principle of
(A) Law of conservation of momentum
(B) Law of conservation of energy
(C) Pascal's law
(D) None of the above 157.Tandem master cylinder consists of
(A) One cylinder and one reservoir
(B) Two cylinders and one reservoir
(C) One cylinder and two reservoirs
(D) Two cylinders and two reservoirs

158. Electronic Stability Program is use to
a) Assist in braking
b) Reducing loss of traction
c) Use in ECU
d) for proper loading and unloading of weight in vehicle

159. When the Electronic Stability Program system intervenes?

a) When it detect probable loss of steering control

b) When tire start to skid

c) When sudden brakes are applied

d) All of above

160. Electronic Stability control generally work when

a) Steering is in over steering and under steering condition

b) When collision has to be prevent

c) Fuel is low

d) Roads are uneven

1.4 Autonomous Vehicles

168. Which is the first robot to understand human emotions?

a. Eskimo

b. Walker

c. Asimo

d. Pepper

169. How many ultrasonic sensors are present in Tesla Model S ?

a. 10

b. 12

c. 14

d. 20

170. Which among the following robot is being made for deep space research and can be sent to mars ?

a. Eskimo

b. Zenbo

c. Valkyrie

d. Pepper

171. “NEXT TWO” is an autonomous vehicle developed by “RENAULT”.

a. True

b. False

172. Which among the following is cargo bot which is used for carrying things ?

a. Paro

b. Zenbo

c. Nova 5

d. Gita

173. Which among the following is an autonomous robot made for rescuing and searching purpose?

a. Paro

b. Zenbo

c. Nova 5

d. Pepper

174. Which among the following is a non humanoid social robot which resembles a dog ?

a. Paro

b. Zenbo

c. Aibo

d. Zenbo

175. Which among the following robot is made for serving the military?

a. Foster-Miller TALON

b. Zenbo

c. Valkyrie

d. Pepper

176. Which organization has developed “SANBOT” ?

a. Google

b. Qihan Technology

c. Space X

d. Boston dynamics

177. Who invented first self driven car?
a. Gruebler owen
b. Joseph henry
c. Norman Bel Geddes
d. Walther Bothe

178. What percentages of accident are caused by human error?
a) 50%
b) 70%
c) 80%
d) 90%

179. Autonomous cars can drive without what?
a) Computer
b) Human
c) Engine
d) Tyre

180. About how many people die every year in car crashes?
a) 500,000
b) 800,000
c) 1.3 million
d) 1 million

181. In which decade did engineers begin experimenting with self-driving cars?
a) 1980s
b) 1960s
c) 1990s
d) 2000s

182. The lowered accident rates from self-driving cars could possibly save about how much money in one year?
a) $800 billion
b) $250 billion
c) $350 billion
d) $450 billion

183. Which among the following is an autonomous delivery vehicle?
a) Para
b) Zenbo
c) Nova 5
d) Nuro R2

184. Self-Driving Car is an example of ___.
a) Data Science
b) Computer Vision
c) NLP
d) Augmented Reality

185. Which of the following is not an advantages of autonomous vehicles.
a) Reduce the driver cost
b) Higher speed limit
c) High cost
d) No need of traffic police

Chapter 2: Process Engineering

2.1 Process Boilers

1] A boiler is a device used to create steam by applying_____to water
a) Light energy b) **heat energy**
c) Wind energy d) mechanical energy
2] Process boiler is a type of boiler with a capacity of_____Buts per hour
a) 200,000 **b) 300,000**
c) 400,000 d) 50,000
3]_____is the most widely used media in distribution of heat over distance in industries
a) Steam b) light
c) Springs c) water
4] The temperature and pressure in saturated stem has_____relationship
a) Direct **b) indirect**
c) Neither of above d) both a and b
5] What should be the temperature of feed water?
a) 12^0 c b) 80^oc
c) 50^0c d) none of above
6] For caring the heat efficiently the steam must be_____
a) dry b) wet
c) saturated d) none of above
9] What happens when air dissolves in condensate?
a) non corrosive b) temperature of air increases
c) corrosive d) none of above
7]_____is used to release condensate in pipe work
a) steam trap **b) valves**
c) power generators d) none of above

8)The process boiler capacity is
a)90Kw b)100kw
c)50KW d)150KW

9)The process boiler related to which activity
a) Machine b) Human
c) Human occupancy **c) Group**

10)The capacity of process boiler
a)150kg/h to 55000kg/h b)120kg/h to 40000kg/h
c)200kg/h to 50000kg/h d)140kg/h to 66000kg/h

11) Process boilers are capable of generating saturated steam at a pressure of
a) 10 to 15 bar b) 10 to 20 bar
c) 20 to 15 bar d) 20 to 40 bar

12) The enthalpy of evaporation is measured in
a) kg/h **b) kJ/kg**
c) kJ/h d) kg/kJ

13) When water under pressure is heated its saturation temperature rises above
a)90°C **b)100°C**
c)50°C d)150°C

14) When point reaches to saturated vapour line the steam attains
a)90% dryness b) 150 % dryness
c)50% dryness **d) 100 % dryness**

15) The point at which the saturated liquid and saturated vapour lines meet is known as the critical point
a) point **b) critical point**
c) High point d) Low Point

16) (PRV) full form
a) press reducing valves b) Power Reduce valves

c) Pressure relief valves **d) pressure reducing valves**

17) As steam reaches the trap, the temperature increases and the trap

a) close b) open

c) close/open d) both

8. Size of boiler tubes is specified by _____

a) Mean diameter and thickness

b) Inside diameter and thickness

c) Outside diameter and thickness

d) Outside diameter and inside diameter

18.The biggest loss in the boiler is _____

a) Moisture in fuel

b) Dry flue gases

c) Steam formation

d) Unburnt carbon

19.Boiler efficiency is a measure of how effectively_____energy in fuel is converted into heatenergy in steam going to the turbines

A Chemical energy B Heat energy

C Thermal energy D All of the above

20. A___incorporates a firebox or furnace in order to burn the fuel and generate heat.

A Steam **B Boiler** C Hydrogen D None

21.Where are steam boilers used in the industries

a) heating requirement for facility

b) steam for batching

c) steam for processing

d) all of the above

22.Which of the following is not a part of a boiler

a) burner the combination

b) chamber

c) water reservoir

d) None above

23.A boiler is an enclosed vessel that provides a means for_____and_____heat to wateruntil it becomes hot water or steam.

a. Generate, boiler

b. Condenser, loop

c. Combustion, transfers

d. All of above

30. Steam produced in a boiler can be used for a variety of purposes including space heating,drying and _____

a. Sterilization

b. Humidification

c. Power generation

d. All of above

31 A safety valve mainly used with locomotive and marine boiler is.

1. Lever Safety Valve.
2. Dead weight safety valve.
3. High steam and low water safety valve.
4. **Spring loaded safety valve.**

32 According to I.B.R., the thickness of the boiler shell should not be less than.

1. 4mm.
2. 5mm.
3. 6mm.
4. **7mm.**

33 Which of the following statements regarding a steam boiler's economizer is untrue?

1. **Superheated steam is produced.**

2. It results in higher boiler efficiency.
3. The purpose of it is to recover heat from flue gases.
4. The supply water is warmed.

34 Coke is produced by
1. pulverizing coal in inert atmosphere.
2. heating wood in a limited supply of air at temperatures below 300°C.
3. **strongly heating coal continuously for about 48 hours in the absence of air in a closed vessel.**
4. binding the pulverized coal into briquettes.

35 The heat loss in a boiler takes place in the form of_____.
1. Heat carried away by flue gases.
2. Heat carried away by ash.
3. Moisture present in fuel and steam formed by combustion of hydrogen in fuel.
4. **All option are correct.**

36 Lancashire boiler is a_____boiler.
1. Single pass.
2. Two pass.
3. **Three pass.**
4. Four pass.

37 What salts of calcium and magnesium cause temporary hardness of boiler feed water?
1. Chlorides.
2. **Bicarbonates.**
3. Nitrates.
4. Sulphates.

38 The fuel mostly used in boilers is?
1. Anthracite.
2. Peat.
3. Lignite.
4. **Bituminous.**

39 Which one of the following is a fire tube boiler?
1. Babcock-Wilcox boiler.
2. **Locomotive boiler.**
3. Stirling boiler.
4. Benson boiler.

40 At critical point the enthalpy of vaporization is
1. Dependent of temperature only.
2. Maximum.
3. Minimum.
4. **Zero.**

2.2 Waste Heat Recovery-Process Industry

1. Out of the following which one is not unconventional source of energy?

(A) Tidal power
(B) Geothermal energy
(C) Nuclear energy
(D) Wind power.

2. Pulverized coal is

(A) Coal free from ash
(B) Non-smoking coal
(C) Coal which bums for long time
(D) Coal broken into fine particles.

3. Heating value of coal is approximately in power plant

(A) 1000-2000 kcal / kg

(B) 2000-4000 kcal / kg

(C) 5000-6500 kcal / kg

(D) 9000-10,500 kcal / kg.

4. Water gas is a mixture of

(A) CO2 and O2

(B) O2 and H2

(C) H2, N2 and O2

(D) CO, N2 and H2.

5. Coal used in power plant is also known as

(A) Steam coal

(B) Charcoal

(C) Coke

(D) Soft coal.

6. Which of the following is considered as superior quality of coal?

(A) Bituminous coal

(B) Peat

(C) Lignite

(D) Coke.

7. In a power plant, coal is carried from storage place to boilers generally by means of

(A) Bucket

(B) V-belts

(C) Trolleys

(D) Manually.

8. Live storage of coal in a power plant means

(A) Coal ready for combustion

(B) Preheated coal

(C) storage of coal sufficient to meet 24 hour demand of the plant

(D) Coal in transit.

9. Pressure of steam in condenser is

(A) Atmospheric pressure

(B) More than atmospheric pressure

(C) Slightly less than atmospheric pressure

(D) much less than atmospheric pressure.

10. Equipment used for pulverizing the coal is known as

(A) Ball mill

(B) Hopper

(C) Burner

(D) Stoker

11. Major advantage of waste heat recovery in industry is:

a) Reduction in pollution b) increase in efficiency

c) Both a & b d) none of the above

12. Heat recovery equipment will be most effective when the temperature of flue gas is:a) 250oC b) 200 oC **c) 400** oC d) 280 oC

13. The waste gases coming out from gas turbine exhausts are of the order of:

a) 370-540 b) 450 – 700 c) 700-800 d) 250-440

14. Recuperated is used mainly as a waste heat recovery system in a_____.

a) Boiler **b) Billet Reheating Furnace**

c) Compressor d) None of the above

15. Recuperated will be more efficient if the flow path of hot and cold fluids is in:

a) Co-current mode **b) Counter current mode**

c) Cross current mode d) Cone of the above

16. The major limitation of metallic recuperated is -------

a) Limitation of handling COx, NOx etc.

b) Limitation of reduced life for handling temperature more than 1000 oC

c) Manufacturing difficulty of the required design

d) None of the above

17. Ceramic remunerators can withstand temperatures up to:

a) 600 oC **b) 1300 oC** c) 1700oC d) 950oC

18. Air preheater is not used as a waste heat recovery system in a_____.

a) Boiler b) billet Reheating Furnace

c) Heat treatment furnace **d) compressor**

19.Typical waste gases temperature from glass melting furnace

a) 1000-1550 oC b) 800-950 oC c) 650–750 oC d) 760-815 oC

20.Regenerator is widely used in:

a) Reheating Furnaces b) heat treatment furnaces

c) Baking Ovens **d) glass melting furnaces**

21.In a low to medium temperature waste heat recovery system which of the device is most suitable

a) Economiser
b) Heat wheels
c) air preheater
d) Recuperator

22. Recovery of heat from dryer exhaust air is a typical application of:

a) Waste heat recovery boiler
b) Heat pump
c) Heat wheel
d) Economizer

23. Capillary wick is a part of

a) heat pump
b) heat wheel
c) heat pipe
d) regenerator

24. Economizer is provided to utilize the flue gas heat for __

a) preheating the boiler feed water
b) preheating the stock
c) preheating the combustion air
d) preheating fuel

25.Recovery of waste heat from hot fluid to fluid is called:

a) thermo compressor
b) waste heat recovery boiler
c) heat Pump
d) economizer

26.Thermo-compressor is commonly used for

a) compressing hot air
b) flash steam recovery
c) distillation
d) reverse compression of CO2

27.The exchanger typically used in the pressurizing section of a dairy plant is

a) Plate heat exchanger
b) Shell and tube exchanger
c) Run around coil exchanger
d) All of the above

28.Pick up the odd one out:

a) Regenerator
b) Recuperator
c) Metallic recuperator
d) Economiser

29.Energy recovery is typically via production of _____

a) Gas

b) Heat

c) Light

d) Steam

30.What is the maximum percent of energy recovered if the steam is condensed before reintroducedto system?

a) 25

b) 35

c) 45

d) 55

31.Which of the following industrial process uses waste as a fuel?

a) Cement kilns

b) Lead manufacturing

c) Acid manufacturing

d) Sulphur manufacturing

32. What is the combustion temperature range in cement kiln incineration?

a) 1300-1600

b) 1350-1650

c) 1250-1450

d) 1235-1600

33.Non-volatile heavy metals in kiln are fixed into __

a) Clinker's crystalline structure

b) Fumes

c) Solid lump

d) Slag

34.Which of the following waste types are not suitable for co-combustion in cement kilns?

a) Chlorine

b) Hydrogen

c) Calcium

d) Carbonate

35.A major advantage of waste heat recovery in industry is

a) Reduction in pollution

c) Increase efficiency

d) None of the above

36.Nellore to medium temperature waste heat recovery system the most suitable device is ------

a) Economizer

b) Heat wheels

c) Air preheater

d) Recuperate

d) Carbonate

37.Which of the following act regulates transportation of hazardous waste?

a) **RCRA**

b) CERCLA

c) NEPA

d) NPL

38.When was the first law regarding transportation of hazardous materials passed?

a) 1966

b) **1866**

c) 1855

d) 1965

39.Which of the following statute made transportation of hazardous materials illegal?

a) 1869

b) 1870

c) **1871**

d) 1872

40.Which of the following act improves regulatory and enforcement activities?

a) **HMTA**
b) DOT
c) ICC
d) NPL

41.A waste heat recovery system in industrial process has been key to reduce.....Consumption.

a) Coal
b) **Fuel**
c) Biogas
d) Oil

42.Heat loss can be classified into …….

a) High temperature
b) Low temperature
c) Medium temperature
d) **All of the above**

43.Heat recovery provides valuable energy sources and ……. consumption.

a) **Reduce energy**
b) Increase energy
c) Increase fuel
d) Reduce fuel

44.Techniques of waste heat recovery …….

a) Direct contact condensation
b) Indirect contact condensation
c) Transport membrane condensation
d) **All of the above**

45.One of the key areas for ……. energy saving in existing systems is waste heat recovery.

a) **Potential**
b) Kinetic
c) Thermal
d) Electrical

46.The biggest point sources of waste heat originate from ……. production.

a) Steel or Brass
b) Copper or Glass
c) **Steel or Glass**
d) Steel or Copper

47.The system is suitable to recover heat from..... temperature exhaust gases .

a) Medium-low
b) **Medium-high**
c) High-low
d) High

48.The waste heat energy could be used to produce …….

a) **Cool air**
b) Hot air
c) Exhaust gas
d) All of the above

49.A waste heat recovery unit is an energy recovery heat exchanger that transfers heat from processoutputs at …

a) **High temperature**
b) Medium temperature
c) Low temperature
d) Both a & b

50.A waste heat recovery unit (WHRU) is an_____that transfers heat from process outputs athigh temperature to another part of the process for some purpose, usually increased efficiency.

a. **Energy recovery heat exchanger**
b. Energy recovery heat diffuser
c. Both ‘a’ and ‘b’
d. None of the above

2.3 Process layout of process industry

1. The fibre dominated by textile industry is _____

a. Linen
b. Silk
c. Cotton
d. Jute

2. A technical textile is a textile product manufactured for _____

a. Aesthetic purpose
b. Non-functional purpose
c. Functional purpose
d. Non-aesthetic purpose

3. The Indian textile industry is said to be _____

a. Non-conventional
b. Non-functional
c. Functional
d. Conventional

4.Food processing in India is concentrated in which sector, maximum?

a) Organized Sector
b) Unorganized sector
c) Small Scale
d) None of the mentioned

5. Which of the following are NOT key constraints of the food processing industry?

a) Inadequate quality control
b) High packaging cost
c) Low demand
d) Poor infrastructure as in no cold storage, warehouse etc

6. The biggest processing segment under food processing is the meat, poultry, vegetables and oil industry.

a) True
b) False

7. Which of the following comes under grain processing in India?

a) Oil seed processing
b) Wheat processing
c) Oil seed & Wheat processing
d) None of the mentioned

8.The main of pharmaceutical industry is to ensure that medicines and health products manufactured are?

a) safe
b) effective
c) both a and b
d) none of the above

9.To identify emulsion type, which of the following test are conducted?

a) dilution test
b) conductivity test
c) dye test
d) all

10.Which of the following is not used as emulsifying agent?

a) surfactant
b) hydrophilic colloid
c) electrolytes
d) finely divided solids

11. Process layout is employed for:

a)batch production
b)continuous type of product

c)effective utilisation of machine
d)all of the above
12. For which of the following industry humid climate is helpful?
a)Cotton
b)Steel
c)Light Bulb
d)Automobile
13.The National Food Security Mission was started in_____
a)October, 2005.
b)October, 2007.
c)October, 2006.
d)October, 2008.
14.Who is the Minister of Food Processing Industries, Government of India?
a)Harsimrat Kaur Badal
b)Pashupati Kumar Paras
c)K. P. Singh Deo
d)Charan Das Mahant
15.Cod liver oil emulsion is used as___
a)Purgative
b)Laxative
c)Source of vitamin
d)Pharmaceutical aid
16.Castor oil emulsion is used as___
a)Purgative
b)Laxative
c)Pharmaceutical aid
d)None of these
17.Solutions are which type of liquids?
a)Bi-Phasic
b)Monophasic
c)Suspension
d)Other than these
19.The largest segment in the Indian technical textile is ____
a)Mobil tech
b)Pack tech
c)Agro tech
d)Build tech
20.The Indian textile industry is said to be ____
a)Non-conventional
b)Non-functional
c)Functional
d)Conventional

2.4 Process Automations

1. _____ means a higher degree of mechanization.
A. Flexible automation
B. Automation
C. Integrated automation
D. None of these
2. An automation, which is easy to implement with high flexibility and reliability, which occupies less space, that needs zero or minimum maintenance, with minimum investment

is called as _____
A. Low cost automation
B. Programmable automation
C. Cellular manufacturing
D. Automation
3. _____ automation is referred as hard automation.
A. Programmable automation
B. Flexible automation
C. Fixed automation
D. Integrated automation
4. Automation which includes equipment that has been designed to accommodate a variety of product configurations is called as _____
A. Integrated Automation
B. Fixed Automation
C. Flexible automation
D. Programmable automation
5. _____ automation is referred as soft automation.
A. Fixed automation
B. Programmable automation
C. Flexible automation
D. None of these
6. _____ is the use of special purpose equipment to automate an assembly line.
A. Flexible automation
B. Integrated automation
C. Fixed automation
D. Programmable automation
7. _____ is an extension of programmable automation.
A. Flexible automation
B. Integrated automation
C. Fixed automation
D. None of the above
8. Integrated automation allows changes in product design to reduce _____ and to optimize production requirements.
A. Production planning
B. Purchasing
C. Marketing
D. Cost
9. Manufacturing functions include
A. Production planning
B. Shop floor control
C. Quality control
D. All of these
10. Automated manufacturing system can be classified into _____ types.
A. 4
B. 3
C. 2
D. 1

3.1 Smart Factory

1. Smart manufacturing technology is____

A. Smart manufacturing is a broad category of manufacturing that employs computer-integrated manufacturing.

B. Smart manufacturing is a broad category of manufacturing that employs integrated manufacturing.

C. Smart manufacturing is a broad category of manufacturing that employs calculator-integrated manufacturing.

D. Smart manufacturing is a broad category of manufacturing that employs numeric-integrated manufacturing.

2. Main advantage of smart manufacturing

A. Quick design change.
C. Digital information technology.
B. High levels of adaptability.
D. All answer

3. Industry 4.0 is____

A. The computerization of traditional industries such as manufacturing.
C. The computerization of supply.
B. The computerization of transport.
D. The computerization of design.

4. The advantage of industry 4.0 is___

A. Higher Efficiency.
C. Increased profitability.
B. Improved Flexibility.
D. All answer

5. The disadvantage of industry 4.0 is____

A. Higher initial cost.
C. Deceased accuracy.
B. Increased labour cost.
D. Less profitability.

6. _____country is the pioneer of the smart manufacturing technology.

A. India.
C. China.
B. Germany.
D. Japan.

7. Smart manufacturing technology utilizes.....

A. Electric cars.
C. Heavy Mechanical machinery.
B. Internet connected machinery.
D. Traditional manufacturing techniques.

8. _____manufacturing technology utilizes autonomous-advanced industrial robots.

A. Traditional manufacturing technology.
C. Small workshops
B. Smart manufacturing technology.
D. None of the above

9. Main application of smart manufacturing technology_____

A. Job production.
C. Batch production.
B. Mass production.
D. All answer.

10. Main application of 3D printing_____

A. Rapid prototyping.
C. Small scale production.
B. Design iteration.
D. All answer.

11. The term smart manufacturing (SM) is originated from which country?
    a) **United States**
    c) Australia
    b) New Zealand
    d) Switzerland
12. _____is the application of smart manufacturing.
    a) **Information communication technology**
    c) Information complex technology
    b) Both a and c
    d) None of the given
13. _____ are the key technologies that enables smart manufacturing.
    A. Sensor technologies
    C. Data analytics
    B. Wireless connectivity
    D. A**ll answer**
14. _____ are the different innovations that takes place in smart manufacturing
    A. Complexity
    C. Costs
    B. Risks
    D. **All answer**
15. _____ is the smart manufacturing.
    A. it is described as paradigm shift made possible by technological advances which constitutes a reversal of conventional production process logic
    B. it is described as rapid shaft made possible by smart technologies
    C. both a and b
    D. all of the above
16. _____ can the smart manufacturing benefit your company.
    A) Increased revenue
    C) Market share
    B) Productivity
    D) **All answer**
17. _____ manufacturers is smart manufacturing empowering.

A) Food and beverages
B) Milky products
C) Packaged products
D) None of the above

18. _____economical potential do you see in smart manufacturing in German speaking area?
A) A plus of 43 billion euros until 2025 in value chain
B) A plus of 59 billion euros until 2025 in value chain.
C) A possible plus of 78 billion euros until 2025 in value chain
D) None of the above

19. _____role does internet of technologies play in context of smart manufacturing.
A) **They form the base to connect everyday items**,
B) They form the base for an environmental friendly production
C) They form among the other the base for corporate communication
D) None of the above

20. Smart manufacturing will reach the market_____
A) To reach a production environment this will not happen before 2030
B) First implementation will be released by 2020
C) Industry 4.0 is already being used in several production lines.
D) All of the above.

21) Smart manufacturing technology is_____
a) is technology that utilize internet connected to machinery to the monitor production process.
b) is not combination of various technology of manufacturing processes.
c) both a and b.
d) none of the above.

22) _____ is smart manufacturing technology
a) Manufacturing design. c) 3D printing and hybrid manufacture.
b) CNC Machining **d) All the above.**

23) Higher quality products, increase energy efficiency and improve productivity are benefit of smart manufacturing technology.
a) True. b) False.

24) The smart manufacturing technology is also known as_____
a) IIOT [industrial internet of things]. **c) Both a and b.**
b) Industry 4.0 d) None of the above.

25) _____ is correct essential features of smart manufacturing.
a) People are not key players. c) Slow integration and flexible configuration.
b) Digital life cycle management is good. d) None of the above.

26) _____ is correct benefit of smart manufacturing technology.
a) Lower quality product. c) Lower the energy efficiency.
b) Does not sustain safer plant floor. **d) Improve productivity.**

27) _____ is percent of smart manufacturing technology by till date.
a) 70% c) 50%
b) 33% d) 100%

28) _____are elements of smart manufacturing technology
a) Devices. c) People and process.
b) Connectivity. **d) all of the above.**

29) Is the decentralization is the one design feature for smart manufacturing technology
a) True. b) False.

30. _____ of the followings is NOT best described about Industry 4.0?
a) Analytics c) **Speed**
b) Smart Factory d) Prediction

31. _____are the objective for industry 4.0.
a. Increase efficiency c. Enabled self-controlling
b. Reduce complexity d. A**ll** .

32. _____ many design principles are applied for Industry 4.0.
a. 6 c**.** 2
b. 4 d. 5

33. Is Decentralization one of the design principles for Industry 4.0
a. **Yes** b. No

34. 5 steps to turn big data become smart data. Please choose the correct one.
a. Data > Knowledge > Information > Wisdom > Decisions
b. Data > Information > Knowledge > Wisdom > Decisions
c. Data > Information > > Decisions > Wisdom > Knowledge
d. Data > Information > Wisdom > Knowledge > Decisions

35. Below is the tools/ software/ applications we have today for Industry 4.0 except
a. Cockpit
b. 3D visualization
c. Condition Monitoring
d. **Performance Manager**

36. One of the solutions we develop to present information for industry 4.0.
a. Auto PiQ
b. Availability Manager
c. **Cockpit**
d. Condition Monitoring

37. _____ is the 6 design principles of Industry 4.0
a. Interoperability, real time capability, visualization, service orientation, decentralization, modular
b. Interoperability, real time capability, visualization, service orientation, decentralization, decisions
c. Interoperability, real time capability, data, service orientation, decentralization, modularity
d. Interoperability, real time capability, visualization, prediction, decentralization, modularity

38. **_____ industry branches are suitable for industry 4.0 development**
a. Industry 4.0 is in first instance an enrichment for the service industry.
b. Industries 4.0 can be used in all industrial contexts where processes need to be more intelligent.
c. Especially in the automotive and agricultural sector.
d. All of the above.

39. **_____is a Smart Factory.**
a. Robots who will replace people.
b. Factories and logistic systems that will operate and organise themselves without human interaction?
c. Factories and logisitc systems that will organise themselves by human interaction.
d. All of the above.

40. Smart manufacturing is a broad category of _____
a. **Manufacturing**
b. Generation
c. Production
d. Services

41. The broad definition of smart manufacturing process cover many different _____
a. Analog
b. Technologies
c. Digital
d. Smart production

42. Smart manufacturing is a technology that utilizes internet connected machinery to monitor the _____ process
a. Production
b. Generation
c. Manufacturing
d. Services

43. The goal of smart manufacturing is to identify the opportunities for _____ operation
a. Automating
b. Manual
c. Robotics
d. Digital transformation

44. Automating operations use data analysis to improve the _____ process
a. Production
b. Manufacturing
c. Services
d. Generation

45. Manufacturers can also analyse the data to try to spot steps in the process where _____ down
a. Production slow
b. Production fast
c. None of the above
d. Both A&B

46. As _____ manufacturing becomes more common in the world of automation
a. Good
b. Smart

c. Digital
d. None of above

47. Full form of NIST
    a. National institute of standards technology
    b. National institute of smart technology
    c. Nation institute of smart technology
    d. None of above
48. Smart manufacturing offers a number of benefits including improved _____
    a. Efficiency
    b. Product rate
    c. Quality rate
    d. All of above
49. Modern machines are often equipped with the _____ sensor
    a. Remote
    b. Keyless
    c. A &B
    d. All of above
50. In smart manufacturing increase in sensors are being used in equipment to……
    a. Self-Sense
    b. Self act
    c. communicate with each other
    d. All of above

3.2 **INDUSTRIAL ROBOTICS**

1. ____ is the name for information sent from robot sensors to robot controllers.
    a) temperature
    b) pressure
    c) feedback
    d) signal
2. Full Form of AGV in Industrial Robotics is_____
    a) Automated Grouped Vehicles
    b) Automatic Guided Vehicles
    c) Alternative Guided Vehicles
    d) All Time Guided Vehicles
3. The following terms refers to the rotational motion of a robot arm____
    a) swivel
    b) axle
    c) retrograde
    d) roll
4. _____ is the name for space inside which a robot unit operates.
    a) environment
    b) spatial base
    c) work envelope
    d) exclusion zone
5. Which of the following terms is NOT one of the five basic parts of a robot.
    a) peripheral tools
    b) end effectors
    c) controller
    d) drive
6. Decision support programs are designed to help managers make _____
    a) budget projections
    b) visual presentations
    c) business decisions
    d) vacation schedules

7. The number of moveable joints in the base, the arm, and the end effectors of the robot determines_____
   a) degrees of freedom
   b) payload capacity
   c) operational limits
   d) flexibility
8. The following places would be LEAST likely to include operational robots.
   a) warehouse
   b) factory
   c) hospitals
   d) private homes
9. For a robot unit to be considered a functional industrial robot, typically, how many degrees of freedom would the robot have.
   a) three
   b) four
   c) six
   d) eight
10. _____is basic parts of a robot unit would include the computer circuitry that could be programmed to determine what the robot would do?
   a) sensor
   b) controller
   c) arm
   d) end effector
11. The following is not an actuator
   a) digital actuator
   b) pneumatic actuator
   c) hydraulic actuator
   d) electric actuator
12. A_____ translates signals from the controller into the motor voltage and current signals.
   a) Servo motor
   b) Servo amplifier
   c) AC motor
   d) DC motor
13. Motors used for electronic actuator drives :
   a) AC servo motors
   b) DC servo motors
   c) Stepper motors
   d) All of the mentioned
14. The basic components of hydraulic fluid power system are :
   a) Reservoir
   b) Pump and lines
   c) Actuating devices and control valves
   d) All of the mentioned
15. Pumps that discharge liquid in a continuous flow are referred to as non-positive displacement.
   a) True
   b) False
16. Connectors and fittings are used in the fluid power system :
   a) To connect to various sections of the fluid lines to each other
   b) To detach the fluid lines to the components of the system
   c) They are used in the high pressure fluid system
   d) None of the mentioned
17. _____ is the back and forth motion of pistons inside of cylinders that provide the flow of fluid.
   a) Fluid pump
   b) Gravity pump
   c) Reciprocating pump
   d) Displacement pump
18. Deciding the method of control by:
   a) The purpose of valve
   b) Type of fluid
   c) Design and purpose of the system

d) All of the mentioned

19. Valves can be classified according to their use as:

a) Directional flow

b) Pressure control

c) Flow control

d) All of the mentioned

20. The kinematic part of the robot or the manipulator is called as

a) link

b) joint

c) end effector

d) sensors

21-Robot is derived from Czech word

(A) Rabota

(B) Robota

(C) Rebota

(D) Ribota

22-A Robot is a

(A) Programmable

(B) Multi functional manipulator

(C) Both (A) and (B)

(D) None of the above

23-The main objective(s) of Industrial robot is to

(A) To minimize the labour requirement

(B) To increase productivity

(C) To enhance the life of production machines

(D) All of the above

24-The following is true for a Robot and NC Machine

(A) Similar power drive technology is used in both

(B) Different feedback systems are used in both

(C) Programming is same for both

(D) All of the above

25-Match the following

Robot part	Function
a. Manipulator arm	1. For holding a piece or tool
b. Controllers	2. Move the manipulator arm and end effector
c. Drives	3. Number of degrees of freedom of movement
d. Gripper	4. Delivers commands to the actuators

(A) a-1, b-4, c-2, d-3

(B) a-3, b-4, c-2, d-1

(C) a-3, b-2, c-4, d-1

(D) a-4, b-3, c-2, d-1

26-Drives are also known as

(A) Actuators

(B) Controller

(C) Sensors

(D) Manipulator

27-Clockwise of Anti clockwise rotation about the vertical axis to the perpendicular arm is provided through

(A) Shoulder swivel

(B) Elbow extension

(C) Arm sweep

(D) Wrist bend

28-Radial movement (in & out) to the manipulator arm is provided by

(A) Elbow extension

(B) Wrist bend

(C) Wrist swivel

(D) Wrist yaw

29-Industrial Robots are generally designed to carry which of the following coordinate system(s).

(A) Cartesian coordinate systems
(B) Polar coordinate systems
(C) Cylindrical coordinate system
(D) All of the above
30-The Robot designed with Cartesian coordinate systems has
(A) Three linear movements
(B) Three rotational movements
(C) Two linear and one rotational movement
(D) Two rotational and one linear movement
31) The following is true for a Robot and NC Machine
(A) Similar power drive technology is used in both
(B) Different feedback systems are used in both
(C) Programming is same for both
(D) All of the above
32) Radial movement (in & out) to the manipulator arm is provided by
(A) Elbow extension
(B) Wrist bend
(C) Wrist swivel
(D) Wrist yaw
33) The Robot designed with Polar coordinate systems has
(A) Three linear movements
(B) Three rotational movements
(C) Two linear and one rotational movement
(D) Two rotational and one linear movement
34) The Robot designed with cylindrical coordinate systems has
(A) Three linear movements
(B) Three rotational movements
(C) Two linear and one rotational movement
(D) Two rotational and one linear movement
35) The following work is done by General purpose robot.
(A) Part picking
(B) Welding
(C) Spray painting
(D) All of the above
36) The following drive is used for lighter class of Robot.
(A) Pneumatic drive
(B) Hydraulic drive
(C) Electric drive
(D) All of the above
37) Internal state sensors are used for measuring _____ of the end effector.
(A) Position
(B) Position & Velocity
(C) Velocity & Acceleration
(D) Position, Velocity & Acceleration
38) ____sensors determines the relationship of the robot and its environment and the objects handled by it
(A) Internal State sensors
(B) External State sensors
(C) Both (A) and (B)
(D) None of the above
39) Which of the following is not a programming language for computer controlled robot?
(A) AMU
(B) VAL
(C) RAIL
(D) HELP
40) In which of the following operations Continuous Path System is used
(A) Pick and Place
(B) Loading and Unloading
(C) Continuous welding
(D) All of the above
41. Robots require extensive information about their environment in order to function effectively.

A. **True**.
B. False.

42. The sensors used to measure position, velocity, and acceleration of the robot joints or end effectors are called as.
    a) External sensors.
    b) **Internal sensors**.
    c) Proximity sensors.
43. Simple touch sensors senses the
    a) **Presence or absence of an object**.
    b) Shape, size or hardness of an object.
    c) Forces along a single axis.
    d) Forces along multiple axis.
44. Complex touch sensors senses the
    a) Forces along a single axis.
    b) Forces along multiple axis.
    c) Presence or absence of an object.
    d) Shape, size or hardness of an object.
45. Simple force sensors senses the
    a) Presence or absence of an object.
    b) Shape, size or hardness of an object.
    c) Forces along a single axis.
    d) Forces along multiple axis.
46. Complex force sensors senses the
    a) Presence or absence of an object.
    b) Shape, size or hardness of an object.
    c) Forces along a single axis.
    d) **Forces along multiple axis**.
47. Simple vision sensors are used for
    a) Detecting holes.
    b) Detecting edges.
    c) Detecting corners.
    d) All of the above.
48. Complex vision sensors are used for
    a) Resizing objects.
    b) Refining objects.
    c) Recognizing objects.
    d) None of the above.
49. Proximity sensors are used for
    a) Contact detection of an object.
    b) Non- contact detection of an object.
    c) Both (a) & (b) are correct.
    d) None of the above.
50. A tactile sensor is defined as a
    a) Sensor which measures information arising from physical interaction with its environment.
    b) Sensor which measures pressure at the end effectors.
    c) Sensor used in navigation of the system.
    d) None of the above.

51. An accelerometer is a device which measures acceleration and ……
    a) Retardation
    b) Tilt
    c) Movement
    d) None of the above
52. Photovoltaic cells convert solar radiation into …….
    a) Thermal energy
    b) Kinetic energy
    c) Mechanical energy
    d) Electrical energy

53. Sensors can also be used for ……
    a) Sound measurement
    b) Distance measurement
    c) Both a) and b) correct
    d) None of the above
54. IMU stands for inertial measurement units.
    a) True
    b) False
55. Robotic sensors are used to estimate a ……
    a) Robot's movement and environment
    b) Robot's movement and condition
    c) Robot's condition and environment
    d) None of the above
56. Gyro Sensor measures the robot's…….. and changes in its orientation.
    a) Linear motion
    b) Angular motion
    c) Rotational motion
    d) All of the above
57. A major advantage of ultrasound sensing is its susceptibility to *specular reflection.*
    a) True
    b) False
58. Range sensor is implemented in ……. of the robot.
    a) End effector
    b) Actuator
    c) Robotic arm
    d) None of the above
59. A sensing device that specifies the contact between an object, and the sensor is considered as …….
    a) IR sensor
    b) Tactile sensor
    c) Proximity sensor
    d) Photo resistor sensor
60. Magnetic sensor is a type of non-contacting sensor which converts the magnetic energy into
    a) Mechanical energy
    b) Kinetic energy
    c) Electrical energy
    d) Pressure energy

61. The anatomy of robot is also known as…… Of robot.
    a) Position
    b) Structure
    c) Motion
    d) Component

62. The Anatomy of Industrial Robots deals with the assembling of outer components of a robot such as
    a) Wrist
    b) Arm
    c) Body
    d) All of the above

63. Most of the robots are composed of 3 main parts**:** the controller, mechanical parts and…….
    a) Sensors
    b) Actuators
    c) Grippers
    d) Manipulator

64. From the beginning robot arm kinematics followed four basic geometrics: cartesian, polar, revolt and…….
    a) Square
    b) Circular
    c) Cylindrical
    d) Rectangular

65. The robot's movements are executed by the mechanical parts likes links,....., and transmission system along

with internal sensors housed within Manipulator.

a) Motion
b) Shoulder
c) Power joints
d) Levers

66. Links are…….. members between joints.

a) Rigid
b) Flexible
c) Strong
d) Weak

67. Most robots possess five or six…….

a) Parts
b) Degree of freedom
c) Arms
d) Motors

68. Robot manipulator consists of two sections: wrist assembly and……..

a) Body and arm
b) Body and body
c) Arm and shoulder
d) Shoulder and body

69. The two main light sensors used in robots are photovoltaic cells and photo……

a) Conductor b) Capacitor c)Inductor d)**Resistor**

70. The manipulator comprises of arm, wrist and……..

a) Shoulder **b)Base** c)Leg d)Head

3.3 Industrial Robot Applications

1)Which of the following is not an advantage of Robots?

1. They can assist humans with disabilities
2. **They can replace jobs**
3. They can be used in dangerous environment
4. They don't get tired or require a break

2) The three characteristic capabilities that define a robot_____

1.Comment
2.Sensor
3.Sense-Plan-Act
4.NXT Brick

3) The main objective(s) of Industrial robot is to

1.To minimise the labour requirement
2.To increase productivity
3.To enhance the life of production machines
4.All of the above

4)_____ work is done by General purpose robot

1.Part picking
2.Welding
3.Spray painting
4.All of the above

5) Internal state sensors are used for measuring _____ of the end effector.

1.Position
2.Position & Velocity
3.Velocity & Acceleration
4.Position, Velocity & Acceleration

6) Which of the name for information sent from robot sensors to robot controllers?

1.temperature
2.pressure
3.signal

4.feedback

7) For a robot unit to be considered a functional industrial robot, typically, how many degrees of freedom would the robot have?

1.three
2.four
3.eight
4.six

8) State the types of robot welding

1.Arc welding
2.spot welding
3.Both 1&2
4.ramp welding

9) Advantage of robotic assembly

1.High capital cost required
2.high expertise required for set up
3.Decreases jobs
4.Improves quality

10) Robotic spot welding brings

1.assistance to operator
2.operator safety
3.better control to operator
4.all the above

11.____ is a highly automated group of GT machine cell.

A. Flexible manufacturing system
B. Group technology
C. Automated system
D. None of the above

12.From the following which is the main components of Flexible manufacturing system(FMS).

A. Main frame computer
B. Automated guided vehicle
C. Material handling system
D. All of the above

13.From the following what is the full form of AGV?

A. Automatic Guided Vehicle
B. Automated Gas Vehicle
C. Automated Guided Vehicle
D. None of the above

14. From the following which is the types of Automated Guided Vehicle (AGV).

A. Driver less train
B. Pallet trucks
C. Unit load carriers
D. All of the above

15. From the following which method is used to guide the AGV.

A. Wire guided
B. Paint strip
C. Self guided vehicle
D. All of the above

16.From the following which is not the application of AGV.

A. Truck loading and unloading
B. To change the tool
C. Material transfer
D. Paper roll transfer

17.From the following which is the benefits of AGV.

A. Reduction in man-hours
B. Useful in hazardous area
C. Both A & B
D. None of the above

18.A combination of equipment and controls which handles, stores and retrieves materials with precision, accuracy and

speed under a defined degree of automation is known as ____
A. Automated storage and retrieval system (AS/RS)
B. Flexible manufacturing system
C. Automated guided vehicle
D. None of the above
19.From the following which is the benefits of AS/RS
A. Less product damage
B. Good and easy housekeeping in FMS
C. Reduce labour cost
D. All of the above
20.From the following which is the type of FMS layout
A. In line layout
B. Ladder layout
C. Both A &B
D. None of the above

3.4 **Immersive Technology**

1 .What does VR stand for?
A)Very Right
B)Vertal Reality
C)Virtual Reality
D)Virtual Realty
2 .What does AR stand for?
A)Application Reality
B)Augmented Reality
C)Application Realive
D)Augmented Realive
3 .Who invented the VR headset?
A)Bob Garry
B)Brian Sanog
C)John Forrest
D)Ivan Sutherland
4 .Which definition best fits "Augmented Reality"?
A)Technology that turns physical objects into digital objects
B)Technology that can achieve a human-level understanding of images
C)Technology that overlays digital information on top of real world items
D)Technology that completely immerses users in a new digital environment
5 .When was the VR headset made?
A)1968
B)1972
C)1981
D)1990
6 .A game based on which animated franchise propelled augmented reality (AR) into the mainstream in recent years?
A)Pokemon
B)Fortnite
C)Super Mario
D)World of Warcraft
7 .HMD stands for?
A)Head Made Display
B)Head Mounted Display
C)Head Masked Display
D)Head Mounted Detection
8 .Augmented reality experiences can be enabled through which of these mediums?
A)Laptops
B)Smartphones
C)Smart boards

D)All of the above

9 .Immersive virtual reality is the most expensive form of VR

A)True

B)False

10 .Why does virtual reality enhance instruction?

A)It allows teachers to communicate with parents

B)It tally's rewards to help with classroom management

C)It provides a deeper understanding with realistic 3D imagery

D)All of the above

11 .Why is investment costs an issue when using AR for education?

A)It cost money to train teachers

B)Schools have to acquire technologies

C)Maintenance cost should be considered

D)All of the above

12 .Which is caused by Augmented Reality?

A)Holocaust

B)Hologram

C)Holophrastic

D)Screensaver

13 .An example of non-immersive VR device is

A)An iPad

B)An IMAX

C)A Screen Projection

D)A Virtual Reality Headset

14 .Who is the father of augmented reality?

A)Steve Mann

B)Brian Sanog

C)John Forrest

D)Kevin Warwick

15 .VR may be useful for students with special needs because

A)They can attend class from home

B)Teachers can develop personalized lessons for students

C)It allows them to escape from difficult social situations

D)None of the Above

16 .Which of the following is NOT a constraint of VR?

A)It can be costly

B)Resistance to new technology from teachers

C)Developing lessons/experiences can be time consuming

D)It can only be used for Science and Geography

17 .A ____ is a display device, worn on head as a part of helmet that has a small display optic.

A)HD

B)MD

C)HMD

D)ARD

18 .What are the 3 types of Virtual Reality?

A)3D, non-immersive, digital

B)Immersive, 3D, non-immersive

C)Digital, semi-immersive, projective

D)Immersive, semi-immersive, non-immersive

19 .A _____ can be recorded using a normal light source.

A)Holograph

B)Holography

C)Photography

D)Photograph

20 .A tracking based on geo-location information.

A)GPS

B)Markerless

C)Location based

D)Marker based