2nd Round

Haramaya University
Haramaya Institute of Technology
Department of Mechanical Engineering

Exit Examination for BSc Degree in Mechanical Engineering

Time Allowed: 3 hrs.

General Instruction

- *Please write your details(name & ID) on the answer sheet space provided;*
- *Make sure the total number of questions is **124**;*
- *Read the questions carefully, choose your correct answer from the given alternatives, and shade the correct answer on the separately attached answer sheet form;*
- *Cheating or any attempt of copying from others during the exam is strictly prohibited;*
- *Using a mobile phone is strictly forbidden;*
- *Using an unnecessary piece of paper or any form of written thing on different body parts lead to disqualification from the exam; and*
- *At the end of the exam, the question paper will be returned along with the answer sheet.*

Prepared by

Department of Mechanical Engineering

April 28, 2023

1. The percentage of carbon in low-carbon steel

A. 0.01%
B. 0.15%
C. 0.3%
D. 0.5%

Answer: B

2. Zn and Mg have the following crystal structure

A. BCC
B. HCP
C. FCC
D. TCP

Answer: B

3. How Many octahedral voids per atom are there in a cubic closed-pack structure

A. 3
B. 4
C. 1
D. 2

Answer: C

4. Fick's law is given by the formula.

A. N_b = -D bc dCb/dx
B. N_b = - 2D bc dCb/dx
C. N_b = -3D bc dCb/dx
D. N_b = D bc dCb/dx

Answer: A

5. For plane (111) of FCC having a lattice parameter "a" planar atomic density is given by

A. $2.31/a^2$
B. $2.31/a^3$
C. $1.31/a^2$
D. $1.31/a^3$

Answer: A

6. What is atomic density on {1 1 1} plane in FCC?

A. $4/\sqrt{3}a^2$
B. $\sqrt{2}/a^2$
C. $2/a^2$
D. $1/a^2$

Answer: A

7. Which of the following relationship is true?

A. E= 2G (1+p)
B. E= 2G (1+p)
C. E= G (2+p)
D. E= 2 (G +p)

Answer: A

8. Which of the following cannot be obtained using a phase diagram?

A. Melting Temperature of various phases
B. Temperature range of solidifications
C. Purity of Materials
D. Equilibrium solid solubility

Answer: C

9. Which is/are phenomena involved in phase transformation?
    A. Nucleation
    B. Growth
    C. Fission
    D. Nucleation and Growth

Answer: D

10. The heat treatment process which is used to increase the toughness and reduce the brittleness is
    A. Annealing
    B. Case hardening
    C. Normalizing
    D. Tempering

Answer: D

11. An equipment or structure fails when its
    A. Ultimate stress is greater than the maximum permissible stress
    B. Factor of safety is equal to 1
    C. Ultimate stress is greater than the working stress
    D. Maximum permissible stress is greater that the yield stress

Answer: D

12. Choice the **CORRECT STATEMENT** about a curved beam
    A. Curved beams are subjected to pure bending only
    B. Distance between any longitudinal fiber of the curved beam from centroidal axis is same before and after bending
    C. Curved beam have large internal curvature and smaller radius of curvature
    D. For curved beam the neutral and centroidal axis coincide/ overlaps

Answer: C

13. _____ measures the deformation of a material in the directions perpendicular to the specific direction of loading
    A. Poisson's ratio
    B. Flexural rigidity
    C. Factor of safety
    D. Section modules

Answer: A

14. For thick cylindrical vessel _____ stress type is not uniform across the thickness and the stress value varies from inner to outer layer.
    A. Radial stress
    B. Axial stress
    C. Hoop stress
    D. Longitudinal stress

Answer: C

15. A beam subjected to moment of force will have a positive bending moment when a ____
    A. Moment of force acting cause the beam to has convex shape
    B. Beam has a sagging moment
    C. Moment of force on the left portion is anticlockwise and the right portion is clockwise
    D. Beam has a hogging moment

Answer: B

16. Which statement **IS INCORRECT STATEMENT**
    A. Principal plane is a plane which have no shear stress acting on it
    B. Obliquity is an angle made by the resultant stress with normal axis of the oblique plane
    C. Principal plane is a plane having normal stresses acting on it
    D. Obliquity is an angle made by the resultant stress with tangent axis of the oblique plane

Answer: D

17. For statically indeterminate structure the deflection at the original beam is obtained by superposing the two deflections due to
    A. The original loads and the reaction force act on fixed structure
    B. Reaction force on fixed structure and redundant act upon released structure
    C. The original loads and redundant act upon released structure
    D. Redundant act on released structure and the original loads on fixed structure

Answer: C

18. Which statement **IS INCORRECT** about non-circular members
    A. There is no shear stress at the corners of the cross-section of the bar
    B. The largest shear stress occurs along the bodies of each faces of the bar
    C. The coefficients of rectangular bar depend the ratio of the wider to the narrower side of the cross-section
    D. The largest deformation occurs along the center lines of each faces of the bar

Answer: B

19. Maximum stress generated due to suddenly applied load is equal to _____produced when the same load is applied gradually
    A. Twice of the stress
    B. Half of the stress
    C. The stress
    D. One third of the stress

Answer: A

20. A load carrying structure may fail depending upon the
    A. Type of structures and material used
    B. Condition of support
    C. Kind of load applied
    D. All

Answer: D

21. A uniform metal bar has a cross-sectional area of $0.6m^2$ and length of 2m. If tensile load of 60KN is suddenly applied to the metal bar. Find the modulus of resilience. Take $E = 2*10^5$ N/m^2
    A. 25 N/m^2
    B. 18 Nm
    C. 50 N/m2
    D. 36 Nm

Answer: A

22. For cylinder to carry high internal fluid pressure _____ is used to reduce the hoop stresses.
    A. Winding weak steal wire under tension on the cylinder
    B. Longitudinal joint
    C. Shrinking one cylinder over the other
    D. Circumferential joint

Answer: C

23. The total pressure on a horizontally immersed surface is (where w = Specific weight of the liquid, A = Area of the immersed surface, and x = Depth of the center of gravity of the immersed surface from the liquid surface)
    A. wA
    B. wx
    C. wAx
    D. wA/x

Answer: C

24. A fluid having no viscosity is known as
    A. Real fluid
    B. Ideal fluid
    C. Newtonian fluid
    D. Non-Newtonian fluid

Answer: B

25. Choose the **CORRECT STATEMENT**
    A. The absolute roughness of a pipe decreases with time.
    B. A pipe becomes smooth after using it for a long time.
    C. The friction factor decreases with time.
    D. The absolute roughness increases with time

Answer: D

26. For laminar flow in a pipe of circular cross-section, *Darcy's friction factor f* is

A. Directly proportional to Reynolds number and independent of pipe wall roughness
B. Directly proportional to pipe wall roughness and independent of Reynolds number
C. Inversely proportional to Reynolds number and independent of pipe wall roughness
D. Inversely proportional to Reynolds number and directly proportional to pipe wall roughness

Answer: C

27. A closed tank containing water is moving in a horizontal direction along a straight line at a constant speed. The tank also contains a steel ball and a bubble of air. If the tank is decelerated horizontally, then

i) the ball will move to the front ii) the bubble will move to the front
iii) the ball will move to the rear iv) the bubble will move to the rear

Find out which of the above statements **IS CORRECT**.

A. (i) and (ii)
B. (i)and(iv)
C. (ii) and (iii)
D. (iii) and (iv)

Answer: B

28. Which of the following **IS INCORRECT** in Limitations on the Use of the Bernoulli Equation:

A. The flow is compressible
B. The flow is steady
C. Heat transfer is negligible
D. Shaft work is not considered

Answer: A

29. In the contact plane between the two materials, thermal contact resistance;

A. Should increase with a decrease in the ambient gas pressure
B. Should increase with an increase in the ambient gas pressure.
C. Should be increased to increase the joint pressure
D. Should be decreased to decrease the joint pressure

Answer: A

30. Suppose we have a cool glass that is poured with boiling water. We lift it up with our bare hands. Which one is not true with the scenario?

A. Heat has flowed from water through the glass.
B. The process of transferring heat in solids is conduction
C. It does not involve movement or flow in the matter itself
D. None

Answer: D

31. Consider the cooling of a hot block by blowing cool air over its top surface;
    A. Energy is carried away from the surface by conduction.
    B. There is the bulk or macroscopic motion of the air that removes the cold air near the surface and replaces it with hot air.
    C. Energy is first transferred to the air layer adjacent to the block by conduction.
    D. There is no bulk or macroscopic motion of the air that removes the heated air near the surface and replaces it with the cooler air.

Answer: C

32. A 30 cm thick wall of 5 m X 3 m size is made of red brick (k = 0.3 W/m ℃). It is covered on both sides by layers of plaster, 2 cm thick (k = 0.6 W/℃). The wall has a window size of 1 m X 2 m. The window door is made of 12 mm thick glass (k = 1.2 W/℃). If the inner and outer surface temperatures are 15℃ and 40℃. Find the rate of heat flow through the wall.
    A. 4.55 kW
    B. 5.30kW
    C. 6.25 kW
    D. 7.35 kW

Answer: B

33. Of the following which one **IS NOT CORRECT** regarding fin effectiveness?
    A. If the fin is used to improve heat dissipation from the surface, then the fin effectiveness must be greater than unity.
    B. To improve the effectiveness of the fin, the fin should be made from high-conductive material.
    C. Effectiveness of the fin can also be increased by increasing the ratio of the perimeter to the cross-sectional area.
    D. A high value of film coefficient hasn't an adverse effect on fin effectiveness.

Answer: D

34. In a counter flow double pipe heat exchanger, water is heated from 25°C to 65°C by oil with a specific heat of 1.45 kJ/kg K and a mass flow rate of 0.9 kg/s. The oil is cooled from 230°C to 160°C. If the overall Heat transfer coefficient is 420 W/m2 °C. Calculate the rate of heat transfer. (Cph = 1.45 $kJ/kg\ K$)
    A. 6**1**.5**5** k$\boldsymbol{W}$
    B. **91.35**k$\boldsymbol{W}$
    C. 8**1**.4**5**k$\boldsymbol{W}$
    D. 7**1**.7**5**k$\boldsymbol{W}$

Answer: B

35. Which one of the following is a CFC refrigerant?
    A. R744
    B. R290
    C. R502
    D. R718

Answer: C

36. A heat engine that has an efficiency of 70% is used to drive a refrigerator having a coefficient of performance of 5. The energy absorbed from the low-temperature reservoir by the refrigerator for each kJ of energy absorbed from the high-temperature source by the engine is

    A. 0.14 KJ
    B. 0.71 kJ
    C. 3.5 kJ
    D. 7.1 kJ

Answer: C

37. For air with a relative humidity of 80%

    A. The dry bulb temperature is less than the wet bulb temperature
    B. The dew point temperature is less than the wet bulb temperature
    C. The dew point and wet bulb temperature are equal
    D. The dry bulb and dew point temperatures are equal

Answer: B

38. Condensing temperature in a refrigerator is the temperature

    A. Of cooling medium
    B. Of freezing zone
    C. Of evaporator
    D. At which refrigerant gas becomes liquid

Answer: D

39. The refrigerant used for absorption refrigerators working on heat from solar collectors is a mixture of water and

    A. Carbon dioxide
    B. Sulphur dioxide
    C. Lithium bromide
    D. R-12

Answer: C

40. Pick up the **CORRECT STATEMENT** about the Equipment Used in an Air Conditioning system

    A. Air conditioning unit: a unit that consists of cooling and dehumidification processes for winter air conditioning or heating and humidification processes for summer air conditioning.
    B. Supply duct: directs the conditioned air from the circulating fan to the space to be air-conditioned at the proper point.
    C. Supply outlet: it is an opening in the room surface that allows the room air to enter the return duct.
    D. Return outlet: distributes the conditioned air in the room.

Answer: B

41. A frequently used quantity in the analysis of combustion processes to quantify the amounts of fuel and air is the

A. Equivalence Ratio
B. Air–fuel Ratio
C. Fuel-air Ratio
D. Theoretical Air Ratio

Answer: B

42. One kmol of octane (C_8H_{18}) is burned with air that contains 20 kmol of O_2 and the combustion products contain only CO_2, H_2O, O_2, and N_2, as a result, what will be the balanced chemical equation for this combustion process?

A. $C_8H_{18} + 20(O_2 + 3.76N_2) \rightarrow 9CO_2 + 7.5H_2O + 9O_2 + 75.2N_2$
B. $C_8H_{18} + 20(O_2 + 3.76N_2) \rightarrow 9CO_2 + 8H_2O + 75.2O_2 + 7.5N_2$
C. $C_8H_{18} + 20(O_2 + 3.76N_2) \rightarrow 8CO_2 + 7.5H_2O + 75.2O_2 + 7.5N_2$
D. $C_8H_{18} + 20(O_2 + 3.76N_2) \rightarrow 8CO_2 + 9H_2O + 7.5O_2 + 75.2N_2$

Answer: D

43. In the absence of any work interactions and any changes in kinetic or potential energies, the chemical energy released during a combustion process either is lost as heat to the surroundings or is used internally to raise the temperature of the combustion products. As the case, if we limit the heat loss to the surroundings to zero, the temperature of the products reaches a maximum. So, the resulting reaction temperature is called?

A. Critical temperature
B. Dew point temperature
C. Adiabatic flame temperature
D. Dry bulb temperature

Answer: C

44. In combustion chambers, the highest temperature to which a material can be exposed is limited by metallurgical considerations. Therefore, what will be an important consideration for example in the design of combustion chambers, gas turbines, and nozzles?

A. Adiabatic flame temperature
B. Equivalence Ratio
C. Thermal efficiency
D. Dry bulb temperature

Answer: A

45. The value of the adiabatic flame temperature of fuel depends on the?

i. State of the reactant
ii. State of the product
iii. Degree of completion of the reaction
iv. Amount of air used

A. i, ii, and iv
B. i, iii, and iv
C. iii, ii, and iv
D. i, ii, and iii

Answer: B

Use the following data for questions from 46 - 48.

R_u= 8.314 kpa.m^3/kmole.K	$M_{O_2} = 32kg/kmole$	$M_{CO_2} = 44\ kg/kmole$
C_v= 21.1 kJ/ kmole. K for O_2	$M_{N_2} = 28kg/kmole$	
C_v= 20.9 kJ/ kmole. K for CO	$M_{CH_4} = 16\ kg/kmole$	

46. If a gas mixture contains O_2, N_2, and CH_4 with the mass of 4 kg, 7 kg, and 11 kg respectively, what will be the average molar mass and gas constant of the mixture respectively?
    A. 0.425 $kg/kmol$, 19.55 $kJ/kg.k$
    B. 20.71 $kg/kmol$, 0.425 $kJ/kg.k$
    C. 20.71 $kg/kmol$, 0.401 $kJ/kg.k$
    D. 19.55 $kg/kmol$, 0.401$kJ/kg.k$

Answer: C

47. A gas mixture has the following compositions on a mole basis: 40 % N_2 and 60% $C0_2$ are given then the mass fraction of N_2, and $C0_2$, and its molar mass of mixture respectively will be?
    A. 0.298, 0.652, and 37.6 $kg/kmol$
    B. 0.298, 0.702, and 34.40 $kg/kmol$
    C. 0.702, 0.298, and 34.40 $kg/kmol$
    D. 0.298, 0.702, and 37.6 $kg/kmol$

Answer: D

48. A vessel of $2m^3$ capacity contains O_2 at 500 kpa and 50℃. The vessel is connected to another vessel of 1.5m^3 capacity containing CO at 100 kPa and 20℃. The connecting valve is opened and the gases are mixed adiabatically. Determine the final temperature and pressure of the mixture.
    A. 318.7 K and 311.56 kPa
    B. 318.7 K and 328.56 kPa
    C. 328.56 K and 318.7 kPa
    D. 311.56 K and 318.7 kPa

Answer: B

49. Second law of thermodynamics?
    i. used to identify the direction of processes
    ii. also asserts that energy has quality as well as quantity
    iii. Provides the necessary means to determine the quality as well as the degree of degradation of energy during a process.
    iv. Used in determining the theoretical limits for the performance of commonly used engineering systems, such as heat engines and refrigerators, as well as predicting the degree of completion of chemical reactions.
    v. Is also closely associated with the concept of perfection.

    A. i, ii, iii, iv, and v
    B. i, ii, iv and v

C. ii, iii, iv, and v
D. i, ii, iv, and v

Answer: A

50. Heat is transferred to a heat engine from a furnace at a rate of 95 MW. If the rate of waste heat rejection to a nearby river is 55 MW, determine the net power output and the thermal efficiency for this heat engine respectively.
    A. 160 MW and 0.594
    B. 40 MW and 0.72
    C. 40 MW and 0.42
    D. 160 MW and 0.34

Answer: C

51. The food compartment of a refrigerator, is maintained at 45℃ by removing heat from it at a rate of 355 kJ/min. If the required power input to the refrigerator is 3 kW, determine the rate of heat rejection to the room that houses the refrigerator.
    A. 1.97 kJ/min
    B. 535 kJ/min
    C. 358 kJ/min
    D. 118.3 kJ/min

Answer: B

52. It is impossible to construct a device that operates in a cycle and produces no effect other than the transfer of heat from a lower-temperature body to a higher-temperature body.
    A. Kelvin -Plank statement
    B. Perpetual motion of the first kind
    C. Perpetual motion of the second kind
    D. Clausius statement

Answer: D

53. Identify the elements which are not part of the data acquisition system
    A. Digital to analog converter
    B. filter
    C. display
    D. timer

Answer: C

54. An ideal OPMP has again of –100. The input is connected to inverting end and the input resistance is 1kΩ. The value of feedback resistance is:
    A. 100kΩ.
    B. 10Ω
    C. 100Ω
    D. 1000kΩ

Answer: A

55. Which one of the following is an active type of transducer
    A. Thermocouple
    B. Photocell
    C. LDR
    D. Potentiometer

Answer: A

56. The voltage of a circuit is measured by a voltmeter having an input impedance comparable with the output impedance of the circuit thereby causing error in voltage measurement. This error may be called
    A. Gross error
    B. Random error
    C. Error caused by misuse of instrument

D. Error caused by loading effect

Answer: D

57. Which one of the following may not be a feature of data acquisition application software?
    A. Manage the data stored in computer memory
    B. Plot-acquired data
    C. Report relevant information such as the number of samples acquired
    D. Acquire data from the real world

Answer: D

58. Which one among others **IS INCORRECT** about calibration?
    A. Producing data agreeable for analysis
    B. Comparison of an instrument with standard
    C. Cleaning and adjusting of instrument
    D. Comparing the output of an instrument against the output of a known instrument

Answer: D

59. Where is the feedback generated by sensors in a mechatronics system given?
    A. Input sensors
    B. Comparators
    C. Mechanical Actuator
    D. Output Sensors

Answer: B

60. A servo motor is a typical example of
    A. Electronic system
    B. Mechatronic system
    C. Computer system
    D. Mechanical system

Answer: B

61. DA Converter is a part of
    A. Odometer
    B. Analog meter
    C. Panel board meter
    D. Proximity Sensor

Answer: D

62. A good amplifier is one which has _____ input resistance and _____ output resistance.
    A. High, Low
    B. Low, High
    C. Low, Low
    D. High, High

Answer: A

63. Actuators are used to
    A. Sense an object
    B. Activate a chemical
    C. Make a mechanical movement
    D. All of the above

Answer: C

64. The programmable logic controllers are used in

A. Glass and paper industry
B. Process automation plants
C. Cement manufacturing
D. All of the above

Answer: D

65. Which one of the following is the source of engine noise

A. The exhaust system
B. The intake system
C. The engine block surface
D. All of the above

Answer: D

66. Among the given conditions which one holds heat losses from the charge to a minimum?

A. The largest possible cylinder volume with the minimum boundary surface
B. The greatest possible expansion ratio
C. The greatest possible working speed
D. A and C

Answer: D

67. In which stroke piston velocity reaches a maximum

A. Near the middle of the stroke
B. At the beginning of the stroke
C. At the end of the stroke.
D. B and C are correct

Answer: A

68. Select the appropriate parameter for correlating engine behavior as a function of speed

A. Mean piston speed
B. Crank rotational speed
C. Wheel speed
D. Camshaft speed

Answer: A

69. The fuels in order of decreasing knock tendency for spark ignition engines are

A. Paraffin, Aromatics, Naphthenes
B. Paraffin, Naphthenes, Aromatics
C. Naphthenic, Aromatics, Paraffin
D. Naphthenic, Paraffin, Aromatics

Answer: B

70. The air standard efficiency of an I.C. engine is given by (where r = Compression ratio, and γ = Ratio of specific heats)

A. $1 - r^{\gamma+1}$
B. $1 + r^{\gamma-1}$
C. $1 - \frac{1}{r^{\gamma-1}}$
D. None of these

Answer: C

71. Which strength of the material is to be considered for design of a ductile component under cyclic load?

A. Ultimate strength
B. Yield strength
C. Endurance strength
D. Fracture strength

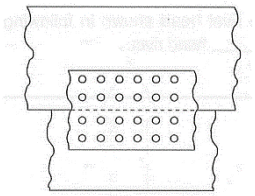
Answer: C

72. Rankine's theory of failure is applicable to the following type of materials

A. Ductile
B. Brittle
C. Plastic
D. Elastic

Answer: B

73. Type of riveted joint shown in the figure below is _____



A. Double riveted lap joint
B. Double riveted butt joint
C. Quadruple riveted lap joint
D. Quadruple riveted butt joint

Answer: B

74. What is the name of the following spring?



A. Helical compression spring
B. Round-ended spring
C. Helical tension spring
D. Torsional spring

Answer: C

75. The key will fail in which of the following manner?

A. Shearing
B. Crushing
C. Both crushing and shearing
D. None of these

Answer: C

76. If the thickness of the cylinder is less than 1/10 of the diameter of the cylinder, then it is treated as

A. Tick cylinder
B. Thin cylinder
C. Longitudinal cylinder
D. Intermediate cylinder

Answer: A

77. A solid uniform shaft of the circular cross-section is subjected to a maximum bending moment of 3 kN-m and a twisting moment of 4 kN-m. The shaft material has an alternate tensile stress of 720 N/mm^2 and ultimate shear stress of 500 N/mm^2. The equivalent twisting moment (T_e) is;

A. 50 kN-m
C. 5 kN-m
B. 15 kN-m
D. 3.5 kN-m

Answer: C

78. Pressure angle of gear teeth preferred for most applications is

A. 20 degrees
C. 15 degrees
B. 45 degrees
D. 30 degrees

Answer: A

79. Which one of the following drives is used for transmitting power without a slip?

A. Belt drives
C. Cone pulleys
B. Rope drives
D. Chain drives

Answer: D

80. What is the function of bearing?

A. Generate heat
B. Ease of motion of shafts and gears
C. Balancing shafts
D. Rotate high speed

Answer: B

81. Which one of the following **IS NOT** a friction clutch?

A. Disc or plate clutch
C. Centrifugal clutch
B. Cone clutch
D. Jaw clutch

Answer: D

82. The friction torque, transmitted in the case of flat pivot bearing for the uniform ratio of wear is equal to:

A. μWR
C. 1/3 μWR
B. 2/3 μWR
D. ½ μWR

Answer: D

83. If there are 'm' physical quantities and 'n' fundamental dimensions in a particular process, the number of non-dimensional parameters is

A. m + n
C. m − n
B. m × n
D. m/n

Answer: C

84. Match the items in columns I and II.

Column I	**Column II**
P. Centrifugal compressor	1. Axial flow
Q. Centrifugal pump	2. Surging
R. Pelton wheel	3. Priming
S. Kaplan turbine	4. Pure Impulse

A. P-2, Q-3, R-4, S-1
C. P-3, Q-4, R-1, S-2
B. P-2, Q-3, R-1, S-4
D. P-1, Q-2, R-3, S-4

Answer: A

85. Maximum theoretical efficiency of the Pelton wheel is obtained when the ratio of bucket speed to jet speed is:

A. 0.26
C. 0.46
B. 0.98
D. 0.58

Answer: B

86. The efficiency of a centrifugal pump is maximum when its blades are:

A. Bent forward first and then backward
B. Bent forward
C. Bent backward
D. Bent backward first and then forward

Answer: C

87. For a Pelton wheel revolving at 770 rpm, the bucket peripheral speed is 60 m/s while the actual jet velocity at the inlet is 137.27 m/s. The Pelton wheel has to develop 15 MW under a net head of 1000 m and a jet ratio of 16. If the overall efficiency is 0.85, then the number of jets required is:

A. 1
C. 3
B. 2
D. 4

Answer: B

88. What does the operating characteristic curve of a turbine mean?

A. Curve is drawn at a constant head
B. Curve is drawn at constant efficiency
C. Curve is drawn at a constant speed
D. Curve is drawn at constant Load

Answer: C

89. Which of the following does represent the purpose of offset cam follower mechanism?

A. Minimize the side thrust
C. Avoid jerk
B. Accelerate
D. All of the above

Answer: A

90. Which of the following **IS NOT** a spring-controlled governor?

A. Hartnell
C. Pickering
B. Hartung
D. Watt Governor

Answer: C

91. In a certain gear train combination the axes of first and last gear are co-axial, then the gear train said to be

A. Simple gear train
C. Compound gear train
B. Reverted gear train
D. Epicyclical gear train

Answer: B

92. Which of the following describe the purpose of a differential gear train in automobiles?

A. Reduce speed
B. Assist in changing speed
C. Provide jerk-free movement of vehicle
D. Help in turning

Answer: D

93. The maximum fluctuation of energy in flywheel illustrates:
    A. Ratio of the maximum energy and minimum energy
    B. Ratio of the mean resisting torque to the work done per cycle
    C. Sum of maximum and minimum energies
    D. Difference between the maximum and minimum energies

Answer: D

94. Consider a motor vehicle moving at a certain speed takes a left turn in a curved path. If the engine rotates in the same direction as that of the wheels, then due to the centrifugal forces
    A. The reaction on the inner wheels increases and on the outer wheels decreases
    B. The reaction on the outer wheels increases and on the inner wheels decreases
    C. The reaction on the front wheels increases and on the rear wheels decreases
    D. The reaction on the rear wheels increases and on the front wheels decreases

Answer: B

95. Which of the following does not fall under the category of hoisting equipment?
    A. Jack
    B. Chain hoist
    C. Dragline
    D. Pull lift

Answer: C

96. Lift trucks are used in industries generally for the transportation of
    A. Non-ferrous Materials
    B. Batches of Materials
    C. Castings Only
    D. Heavy Equipment

Answer: B

97. A four-wheel drive has
    A. No Differential
    B. Differential on the rear side only
    C. Differential on the front side only
    D. Both front as well as rear differentials

Answer: D

98. Bearing used on railway wagons are
    A. Plumber Blocks
    B. Needle Bearings
    C. Roller Bearings
    D. Ball Bearing

Answer: C

99. Tanker-type wagons are used on railways for the transportation of
    A. Grains
    B. Powders
    C. Fertilizers
    D. Oils

Answer: D

100. Electric Overhead traveling cranes operate on
    A. DC Only
    B. Either AC or DC
    C. AC Only
    D. Both on AC and DC

Answer: C

101. Which of the following is **NOT TRUE** about the Casting process?
   A. It is important for manufacturing Intricate shapes
   B. It is simple and inexpensive as compared to other processes
   C. Size and weight of the product are not a limitation of the casting process.
   D. None of the above

Answer: D

102. Which one of the following casting defects is unique from the others
   A. Misrun
   B. Cold shut
   C. Mold shift
   D. Shrinkage cavity

Answer: C

103. Why do machine tools are wide ranges of cutting speeds and feed rates?
   A. To machine different jobs
   B. To use different cutting tools
   C. To perform various operations
   D. All of the above

Answer: D

104. Which of the following is **NOT TRUE** about Milling Machine
   A. In the case of down milling, the cutter rotation is in the same direction as the motion of the workpiece being fed
   B. In the case of down milling, the cutter rotation is in the opposite direction with the motion of the workpiece being fed
   C. In the case of up milling, the cutter rotation is in the opposite direction with the motion of the workpiece being fed
   D. None of the above

Answer: B

105. Why is it important measuring of cutting forces during a machining process?
   A. To estimate the power consumption
   B. To design the structural part of the machine–fixture–tool system
   C. To study of behaviour and machinability characterization of the work materials
   D. All of the above

Answer: D

106. During the drilling operation which of the following force is large in magnitude?
   A. Axial force
   B. Radial force
   C. Transverse force
   D. All of the above

Answer: A

107. The plastics that soften when heat is applied, whether under pressure or not, but need chilling to shape them include
   A. thermosetting materials
   B. thermoplastic materials
   C. thermostatting materials
   D. thermosofting material

Answer: B

108. Which of the following is a powder metallurgy step?
    A. The consolidation and fusing of the powder into a solid metal
    B. The compaction and shaping of the powder
    C. The production of metal powder
    D. All of the above

Answer: D

109. Which of the following **IS TRUE** about rolling operation
    A. Roll speed and strip speed are equivalent at a neutral location
    B. The rollers cannot draw new strips when the contact angle is greater than the friction angle
    C. Roll torque and power rise as roll work contact length or roll radius increases
    D. All of the above

Answer: D

110. Which best explains why mechanical assembly is frequently chosen over others?
    A. Ease of disassembling
    B. No heat affected zone in the base parts
    C. Economies of scale
    D. Specialization of labour

Answer: A

111. Which of the following welding types has an advantage in places where electricity is unavailable?
    A. TIG and MIG
    B. Oxyacetylene and Slag welding
    C. Thermite and Oxyacetylene
    D. Plasma and Submerged arc welding

Answer: C

112. During the machining process, using a negative rake-cutting tool can offer an advantage like
    A. Reduce cutting force and power consumption
    B. Increase cutting-edge strength and tool life
    C. Avoiding rubbing of the tool flank
    D. Simplicity in the design and manufacturing of the cutting tool

Answer: B

113. It is known that Mechanical damage may occur during the manufacture, transportation, on-site handling and laying of materials. Usually, such damage is found and remedied prior to service. However, some damage may not be detected until the material has been put into service. The most common types of damage that mechanical actions can cause:
    A. Impact damage
    B. Cutting, scratching and keying
    C. Abrasion, erosion of particles due to wearing
    D. All

Answer: D

114. Inadequate and inefficient maintenance system especially in a manufacturing enterprise gives rise to several undesirable consequences. One is wrong about these consequences

A. Shortened life-span of the facility
B. Frequent emergency maintenance work
C. Ability to meet delivery dates
D. Excessive machine breakdown

Answer: C

115. Haramaya University have eight electric water pumps which have been in service for five years. During this period four of the water pump have failed. Determine the failure rate per annum and the mean time between failures.

A. 0.1 failures/yr.; 10 years
B. 0.5 failures/yr.; 5 years
C. 0.1 failures/yr.; 1 year
D. None

Answer: A

116. Every organization should proceed systematically and establish an effective spare parts management system. One is incorrect systematic actions that is required to ensure the spare parts management effective;

A. Identification of spare parts and forecasting of spare parts requirement
B. Finance department is facing the problem of increasing locked-up capital in spare parts inventory
C. Development of inventory control systems and inventory analyses
D. A & C

Answer: D

117. A work order system is one of the most powerful tools a maintenance team can use.

A. It acts as centralized, automated way to request and record work done within an organization.
B. It is important because of the amount of work maintenance supervisors need to track
C. It gives crews and supervisors a single method of communication, an integrated communication platform, a work order system lets supervisors organize workloads, assign tasks and track completion
D. All

Answer: D

118. In the context of the industrial sector, one is incorrect about the maintenance

A. The actions to control the deterioration process leading to the failure of a system, “preventive maintenance”,
B. Keep all equipment available in an organization in as-built condition, so that it continues to have its original productive capacity.
C. The act of maintaining or the state of being maintained; the work of keeping something in proper condition; “upkeep.”
D. The restoration of the system to its operational stage through corrective action after the occurrence of failure, “corrective maintenance”

Answer: C

119. In the following which are the Production management activities?

A. Repairs and Maintenance
B. Promotional Activities
C. Man Power Planning
D. All the above

Answer: A

120. The following is the principle of organization.

A. Tactical Plans
B. Operational Plans
C. Departmentalization
D. Downward Communication

Answer: C

121. Order of Manufacturing Functions?

A. R-W-T-P-S
B. R-T-W-S-P
C. R-P-S-W-T
D. R-W-P-S-T

Where R-Receiving, T-Transport, S-Shipping, P-Production, W-Warehousing

Answer: A

122. It has the responsibility for developing efficient processes for the manufacture of the products developed

A. Product Design
B. Plant Engineering
C. Process Design
D. Cost Estimation

Answer: C

123. In which layout Project or Product remains stationary

A. Product-Oriented Layout
B. Retail Layout
C. Process-Oriented Layout
D. Fixed Position Layout

Answer: D

124. Determine the number of workstations if the production time is 36000 sec, Output is 360 per day and the sum of task time is 500 sec.

A. 10
B. 5
C. 8
D. 12

Answer: B