Test Booklet Series

A

Test Booklet
(Mechanical Engg.)

Test Booklet No.

Name of Applicant ..... Answer Sheet No. .....

Applicant ID/Roll No. : ..... Signature of Applicant : .....

Date of Examination : ..... Signature of the Invigilator(s)

Time of Examination : ..... 1. .....

2. .....

Duration : 2 Hour] **[Maximum Marks : 100**

IMPORTANT INSTRUCTIONS

(i) The question paper is in the form of Test-Booklet containing **100 (Hundred)** questions. All questions are compulsory. Each question carries four answers marked (A), (B), (C) and (D), out of which only one is correct. Choose the correct option or the most appropriate option.

(ii) On receipt of the Test-Booklet (Question Paper), the candidate should immediately check it and ensure that it contains all the pages, i.e., **100** questions. Discrepancy, if any, should be reported by the candidate to the invigilator immediately after receiving the Test-Booklet.

(iii) A separate Answer-Sheet is provided with the Test-Booklet/Question Paper. On this sheet there are **100** rows containing four circles each. One row pertains to one question.

(iv) The candidate should write his/her Application ID/Roll number at the places provided on the cover page of the Test-Booklet/Question Paper and on the Answer-Sheet and NOWHERE ELSE.

(v) No second Test-Booklet/Question Paper and Answer-Sheet will be given to a candidate. The candidates are advised to be careful in handling it and writing the answer on the Answer-Sheet.

(vi) For every correct answer of the question **One (1) mark will be awarded**.

(vii) Marking shall be done only on the basis of answers responded on the Answer-Sheet.

(viii) To mark the answer on the Answer-Sheet, candidate should darken the appropriate circle in the row of each question with Blue or Black pen.

(ix) For each question only **one** circle should be **darkened** as a mark of the answer adopted by the candidate. If more than one circle for the question are found darkened or with one black circle any other circle carries any mark, the answer will be treated as incorrect.

(x) The candidates should not remove any paper from the Test-Booklet/Question Paper. Attempting to remove any paper shall be liable to be punished for use of unfair means.

(xi) Rough work may be done on the blank space provided in the Test-Booklet/Question Paper only.

(xii) *Mobile phones (even in Switch-off mode) and such other communication/programmable devices are not allowed inside the examination hall.*

(xiii) No candidate shall be permitted to leave the examination hall before the expiry of the time.

DO NOT OPEN THIS QUESTION BOOKLET UNTIL ASKED TO DO SO.

PART–A

1. Research is
   (A) Searching again and again
   (B) Finding a solution to any problem
   (C) Working in a scientific way to search for the truth of any problem
   (D) None of the above

2. The conceptual framework in which research is conducted is called a
   (A) Synopsis of research
   (B) Research design
   (C) Research hypothesis
   (D) Research paradigm

3. What are the main characteristics of Scientific Research?
   (A) Empirical
   (B) Theoretical
   (C) Experimental
   (D) All the above

4. Which research design will be most appropriate to study the relationship between the level of aspirations and achievement of rural children?
   (A) Experimental Research Design
   (B) Ex Post Facto Research Design
   (C) Historical Research Design
   (D) Survey Research Design

5. The principles of fundamental research are used in:
   (A) action research
   (B) applied research
   (C) philosophical research
   (D) historical research

6. A shift in attitude in respondents between two points during data collection is called
   (A) Reactive effect
   (B) Maturation effect
   (C) Regression effect
   (D) Conditioning effect

7. Ethical Norms in research do not involve guideline for:
   (A) Thesis Format
   (B) Copyright
   (C) Patenting Policy
   (D) Data sharing Policy

8. The primary objective of an experimental research design is to:
   (A) Explore an unknown topic.
   (B) Establish cause-and-effect relationships.
   (C) Describe a population or situation.
   (D) Examine the relationship between variables without manipulation.

9. The research that aims at immediate application is:
   (A) Action Research
   (B) Empirical Research
   (C) Conceptual Research
   (D) Fundamental Research

10. A null hypothesis is
   (A) when there is no difference between the variables
   (B) the same as research hypothesis
   (C) subjective in nature
   (D) when there is difference between the variables

11. When the researcher rejects a true null hypothesis a ---------- error occurs.
   (A) Type I
   (B) Type A
   (C) Type II
   (D) Type B

12. The researcher is usually interested in supporting ..... when he or she is engaging in hypothesis testing:
   (A) The alternative Hypothesis
   (B) The null Hypothesis
   (C) Both alternative and null Hypothesis
   (D) Neither the alternative or null Hypothesis

13. A research design is often described as the "blueprint" for a research project. This emphasizes its role in:
   (A) Collecting data
   (B) Analysing data
   (C) Providing a strategy and framework for the study
   (D) Presenting findings

14. What is a cross-sectional research design?
(A) A design in which a data is collected at one point of time.
(B) A design in which data is collected over a period of time.
(C) A design in which data is collected from a representative sample of the population.
(D) A design in which data is collected from a non-representative sample of the population.

15. Match the measurement scale to the given variables:

Scale of measurement	**Variable**
(a) Nominal	(i) Height of student
(b) Ordinal	(ii) Time of day
(c) Interval	(iii) Caste
(d) Ratio	(iv) Rank of Army Personnel

Choose the correct answer from the options given below:
(A) (a) – (i), (b) – (ii), (c) – (iii), (d) – (iv)
(B) (a) – (ii), (b) – (iii), (c) – (iv), (d) – (i)
(C) (a) – (iii), (b) – (iv), (c) – (ii), (d) – (i)
(D) (a) – (iv), (b) – (i), (c) – (ii), (d) – (iii)

16. Which is the simplest form of Measurement?
(A) Ordinal (B) Nominal
(C) Ratio (D) Interval

17. The data is obtained through a survey conducted is called:
(A) Primary data (B) Secondary data
(C) Continuous data (D) Qualitative data

18. A survey in which the information is collected from each and every individual of the population is known as:
(A) Sample survey (B) Pilot survey
(C) Biased survey (D) Census survey

19. Interview is an example of which data?
(A) Primary data (B) Secondary data
(C) Both (A) and (B) (D) None of the above

20. What is the process of organizing raw data into rows and columns for systematic analysis called?
(A) Compilation
(B) Presentation
(C) Tabulation
(D) Classification

21. The graphical representation of a frequency distribution is called
(A) Bar chart
(B) Line chart
(C) Histogram
(D) Pie char

22. Identify the correct sequence of research steps:
(A) Selection of topic, review of literature, data collection, interpretation of findings
(B) Review of literature, selection of topic, data collection, and interpretation of findings
(C) Selection of topic, data collection, review of literature, interpretation of findings
(D) Selection of topic, review of literature, interpretation of findings, data collection

23. When a research problem is related to heterogeneous population, the most suitable sampling method is:
(A) Cluster Sampling
(B) Stratified Sampling
(C) Convenient Sampling
(D) Lottery Method

24. A researcher wants to study the long-term effects of a new teaching method on student performance over several years. Which research design would be most appropriate?
(A) Cross-sectional design
(B) Case study design
(C) Longitudinal design
(D) Survey design

25. From the list given below identify those which are called non-probability sampling procedures:
(i) Simple random sampling
(ii) Dimensional sampling
(iii) Snowball sampling
(iv) Cluster sampling
(v) Quota sampling
(vi) Stratified sampling
Choose the correct option
(A) (i), (ii) and (iii)
(B) (ii), (iv) and (v)
(C) (i), (iii) and (v)
(D) (ii). (iii) and (v)

26. Among the following types of sampling techniques, which one is also known as 'Judgmental' sampling?

(A) Quota sampling
(B) Convenience Sampling
(C) Cluster Sampling
(D) Purposive Sampling

27. The primary objective of an experimental research design is to:

(A) Explore an unknown topic.
(B) Establish cause-and-effect relationships.
(C) Describe a population or situation.
(D) Examine the relationship between variables without manipulation.

28. "Students from the pure mathematics background can crack a bank recruitment test"—Which type of hypothesis is this?

(A) Relational Hypothesis
(B) Descriptive hypothesis
(C) Two tailed Hypothesis
(D) Null Hypothesis

29. Parametric tests make assumptions on:

(A) The population size
(B) The underlying distribution
(C) The sample size
(D) The mean sample

30. If the researcher has a nominal data, which non parametric test will he/she can use:

(A) T-test
(B) Z-test
(C) Chi square test
(D) All the above

31. If a researcher needs to verify whether there is a significant difference between the means of two groups to test a hypothesis, which statistical method would he/she employ?

(A) Chi-square test
(B) Correlation coefficient
(C) Sign-test
(D) Student's t-test

32. Chi-square is used to analyse:
(A) Scores
(B) Ranks
(C) Frequencies
(D) None of these

33. On which of the following does the critical value for a chi-square statistic rely?
(A) The degrees of freedom
(B) The sum of the frequencies
(C) The row totals
(D) The number of variables

34. Calculated value of chi-square is always.....
(A) Positive
(B) Negative
(C) Zero
(D) None of these

35. Which of the following best describes the purpose of using ANOVA in research?
(A) ANOVA is used to compare the means of two groups.
(B) ANOVA is use to compare the means of more than two groups.
(C) ANOVA is used to determine the correlation between two variables.
(D) ANOVA is used to determine the interaction effect between dependent variables.

36. What do ANOVA calculate?
(A) T-Ratio
(B) Chi-square
(C) Z-Ratio
(D) F-Ratio

37. What is the primary goal of factor analysis?
(A) To predict a dependent variable from multiple independent variables.
(B) To reduce a large number of variables into a smaller set of underlying factors.
(C) To determine the causal relationship between variables.
(D) To calculate the correlation between two variables.

38. Which assumption is required for factor analysis?
(A) Extreme collinearity exists among variables.
(B) Variables have a skewed distribution.
(C) A linear relationship exists among variables.
(D) There are many outliers in the data.

39. When using Principal Component Analysis (a common method for factor analysis), what does the first principal component capture?
(A) The minimum variance.
(B) The mean deviation.
(C) The maximum variance.
(D) The average variance.

40. Which statistical measure is used to assess the sampling adequacy for conducting factor analysis?
(A) Kaiser-Meyer-Olkin (KMO) measure.
(B) Bartlett's test of sphericity.
(C) Eigenvalue.
(D) All of the above.

41. The process by which we estimate the value of dependent variable on the basis of one or more independent variable is called:
(A) Correlation
(B) Regression
(C) Residual
(D) Slope

42. The major characteristic of correlation analysis is to seek out
(A) Differences among variables
(B) Variations among variables
(C) Association among variables
(D) Regression among variables

43. A correlation coefficient (r) of –1.0 indicates a:
(A) Perfect positive correlation
(B) Weak positive correlation
(C) No correlation
(D) Perfect negative correlation

44. The statistical tool that studies the degree of association between two variables is called:
(A) Regression
(B) Standard error
(C) Index numbers
(D) Correlation

45. Which type of correlation analysis is appropriate for examining the relationship between variables with non-linear relationships?
(A) Pearson's correlation
(B) Spearman's rank correlation
(C) Both Pearson's and Spearman's
(D) Neither Pearson's nor Spearman's

46. What is the primary goal of cluster analysis?
(A) Classifying data into predefined groups.
(B) Predicting a continuous value.
(C) Grouping similar data points together based on their characteristics.
(D) Reducing the number of variables in a dataset.

47. The primary purpose of conjoint analysis is to:
(A) Identify which customer segments are most profitable.
(B) Determine the price elasticity of demand for an existing product.
(C) Quantify the value that consumers place on different features of a product or service.
(D) Predict sales volume for a new product with absolute certainty.

48. The most common type of conjoint analysis, which presents respondents with sets of product profiles and asks them to choose the one they prefer most, is known as:
(A) Adaptive Conjoint Analysis (ACA).
(B) Choice-Based Conjoint (CBC).
(C) Full-Profile Conjoint Analysis.
(D) Self-Explicated Conjoint Analysis.

49. Which statement is an accurate representation of a "trade-off" in conjoint analysis?
(A) A decision to buy a product from one brand over another.
(B) A decision to delay a purchase until a later date.
(C) A customer choosing a larger screen over longer battery life for a phone.
(D) A customer buying a product with all the most desired features.

50. What is the primary purpose of discriminant analysis?
(A) To determine the effect of independent variables on a continuous dependent variable.
(B) To identify the underlying structure or dimensions within a set of variables.
(C) To classify cases into two or more distinct, pre-defined groups based on a set of predictor variables.
(D) To cluster data points into a specific number of groups based on their similarities.

PART–B

(Mechanical Engg.)

51. Two disks A and B with identical mass (m) and radius (R) are initially at rest. They roll down from the top of identical inclined planes without slipping. Disk A has all of its mass concentrated at the rim, while Disk B has its mass uniformly distributed. At the bottom of the plane, the ratio of velocity of the center of disk A to the velocity of the center of disk B is ____.

(A) $\sqrt{(3/4)}$ (B) $\sqrt{(3/2)}$

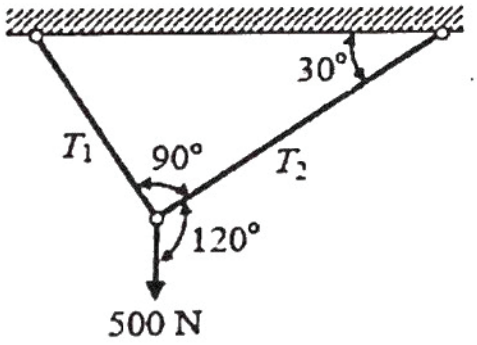
(C) 1 (D) $\sqrt{2}$

52. The coefficient of restitution of a perfectly plastic impact is____.

(A) Zero (B) 1

(C) 2 (D) Infinite

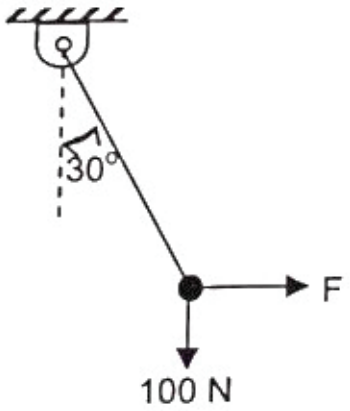
53. A weight of 500 N is supported by two metallic ropes as shown in the figure. The values of tensions T_1, and T_2 are respectively :



(A) 250 N and 433 N (B) 433 N and 250 N

(C) 353.5 N and 250 N (D) 250 N and 353.5 N

54. A rigid ball of weight 100 N is suspended with the help of a string. The ball is pulled by a horizontal force F such that the string makes an angle of 30° with the vertical. The magnitude of force F (in N) is _____.



(A) 115 - 116 (B) 57 - 58

(C) 75 - 76 (D) 37 - 38

55. The initial velocity of an object is 40 m/s. The acceleration "a" of the object is given by the following expression : a = –0.1 v, where v is the instantaneous velocity of the object. The velocity of the object after 3 seconds will be ____ m/s.

(A) 32 - 33 (B) 92 - 93

(C) 29 - 30 (D) 19 - 20

56. A steel bar of 40 mm × 40 mm square cross-section is subjected to an axial compressive load of 200 kN. If the length of the bar is 2 m and E = 200 GPa. The elongation of the bar will be ____.

(A) 1.25 mm (B) 2.70 mm

(C) 4.05 mm (D) 5.40 mm

57. The beams, one having square cross-section and another circular cross-section, are subjected to the same amount of bending moment. If the cross-sectional area as well as the material of both the beams are the same then ____.

(A) maximum bending stress developed in both the beams is the same

(B) the circular beam experience more bending stress than the square one

(C) the square beam experience more bending stress than the circular one

(D) as the material is same both beams will experience same deformation

58. Two shafts A and B are made of the same material. The diameter of shaft B is twice that of shaft A. The ratio of power which can be transmitted by shaft A to that of shaft B is____.

(A) 1/2 (B) 1/4

(C) 1/8 (D) 1/16

59. For a long slender column of uniform cross-section, the ratio of critical buckling load for the case with both ends clamped to the ease with both ends hinged is____.

(A) 1 (B) 2

(C) 4 (D) 8

60. A cylindrical elastic body subjected to pure torsion about its axis develops____.

(A) tensile stress in a direction 45° to the axis

(B) no tensile or compressive stress

(C) maximum shear stress along the axis of the shaft

(D) maximum shear stress at 45° to the axis

61. A ductile material having an endurance limit of 196 N/mm^2 and the yield point at 294 N/mm^2 is stressed under variable load. The maximum and minimum stresses are 147 N/mm^2 and 49 N/mm^2. The fatigue stress concentration factor is 1.32. The available factor of safety for this loading is____.

(A) 3.0 (B) 1.5

(C) 1.33 (D) 4.0

62. Match the rolling element bearings with the most appropriate loading condition :

	Bearing Type		**Loading Condition**
(a)	Ball bearing	P.	Tangential load
(b)	Roller bearing	Q.	Radial load
(c)	Needle bearing	R.	Heavy radial load with impact
(d)	Taper roller bearing	S.	Light radial load with space limitation
		T.	Heavy radial and axial load
		U.	Fatigue load

(A) (a)-Q; (b)-S; (c)-R; (d)-T (B) (a)-U; (b)-Q; (c)-R; (d)-T

(C) (a)-Q; (b)-Q; (c)-T; (d)-R (D) (a)-Q; (b)-Q; (c)-R; (d)-T

63. For the given statements :

I. Mating spur gear teeth is an example of higher pair.

II. A revolute joint is an example of lower pair.

Indicate the correct answer

(A) both I and II are false (B) I is true and II is false

(C) I is false and II is true (D) both I and II are true

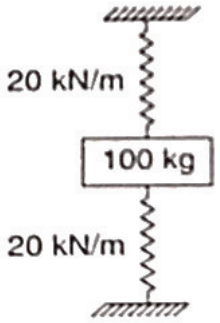
64. Match the items in Columns-I and II :

	Column-I		**Column-II**
P.	Addendum	1.	Cam
Q.	Instantaneous center of velocity	2.	Beam
R.	Section modulus	3.	Linkage
S.	Prime circle	4.	Gear

(A) P-4, Q-2, R-3, S-1 (B) P-4, Q-3, R-2, S-1

(C) P-3, Q-2, R-1, S-4 (D) P-3, Q-4, R-1, S-2

65. As shown in figure, a mass of 100 kg is held between two springs. The natural frequency of vibration of the system in cycles/s is ____.



(A) $1/2\pi$ (B) $5/\pi$

(C) $10/\pi$ (D) $20/\pi$

66. The iron-carbon diagram and the TTT curves are determined under____.

(A) equilibrium and non-equilibrium conditions respectively

(B) non-equilibrium and equilibrium conditions respectively

(C) equilibrium conditions for both

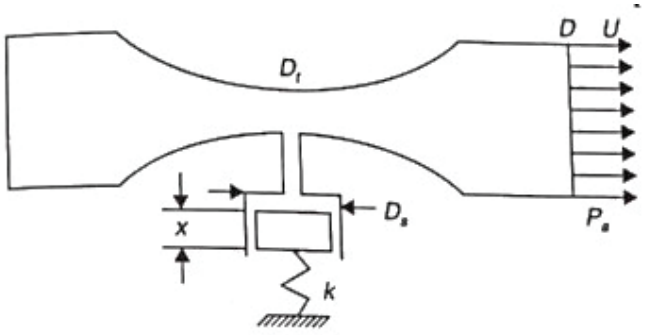
(D) non-equilibrium conditions for both.

67. In a certain slider-crank mechanism, lengths of crank and connecting rod are equal. If the crank rotates with a uniform angular speed of 14 rad/s and the crank length is 300 mm, the maximum acceleration of the slider (in m/s^2) is____.

(A) 215-220 (B) 55-60

(C) 7.5-10 (D) 115-120

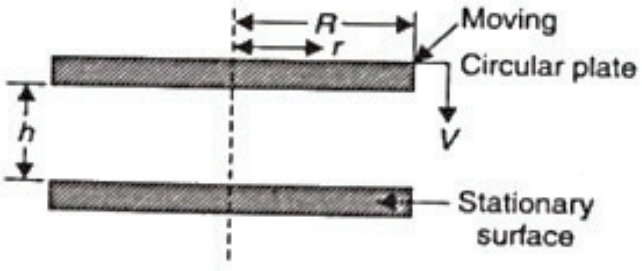
68. Air flows through a venture and into atmosphere. Air density is ρ; atmospheric pressure is 'Pa'; throat diameter is 'Dt' exit diameter is D and exit velocity is 'U'. The throat is connected to a cylinder containing a frictionless piston attached to a spring. The spring constant is 'k'. The bottom surface of the piston is exposed to atmosphere. Due to the flow, the piston moves by distance 'x' Assuming in compressible frictionless flow, then 'x' is____.



(A) $(\rho U^2/2k)\pi D_s^2$ (B) $(\rho U^2/8k)\left(\frac{D^2}{D_t^2}-1\right)\pi D_s^2$

(C) $(\rho U^2/2k)\left(\frac{D^2}{D_t^2}-1\right)\pi D_s^2$ (D) $(\rho U^2/8k)\left(\frac{D^4}{D_t^4}-1\right)\pi D_s^2$

69. The gap between a moving circular plate and a stationary surface is being continuously reduced, as the circular plate comes down at uniform speed V towards the stationary bottom surface, as shown in the figure. In the process, the fluid contained between the two plates flows out radially. The fluid is assumed to be incompressible and inviscid. The radial component of the fluid acceleration at r = R, is ____.



(A) $3V^2R/4h^2$ (B) $V^2R/4h^2$

(C) $3V^2R/2h^2$ (D) $V^2h/4R^2$

70. A fluid is said to be Newtonian fluid when the shear stress is ____.

(A) directly proportional to the velocity gradient

(B) inversely proportional to the velocity gradient

(C) independent of the velocity gradient

(D) none of the above

71. Within a boundary layer for a steady incompressible flow, the Bernoulli equation____.

(A) holds because the flow is steady

(B) holds because the flow is incompressible

(C) holds because the flow is transitional

(D) does not hold because the flow is frictional

72. Kaplan water turbine is commonly used when the flow through its runner is____.

(A) axial and the head available is more than 100 m

(B) axial and the head available is less than 10 m

(C) radial and the head available is more than 100 m

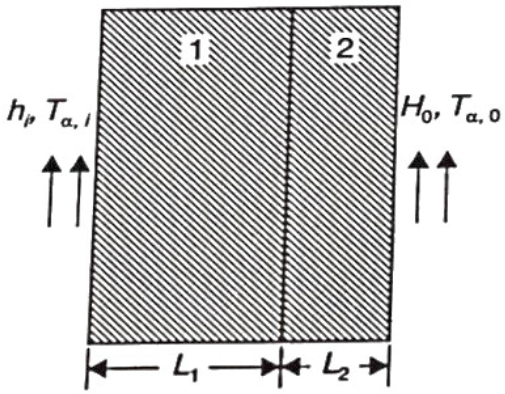
(D) mixed and the head available is about 50 m

73. Cavitation in a hydraulic reaction turbine is 1 most likely to occur at the turbine ____.

(A) entry (B) exit

(C) stator exit (D) rotor exit

74. Consider the steady state heat conduction across the thickness in a plane composite wall as shown in figure exposed to convection condition on both sides



Given h_i, = 20 W/m^{2}K; h_o = 50 W/m^{2}K

$T_{\alpha i}$ = 20°C; $T_{\alpha o}$ = –2°C; K_1 = 20 W/mK

K_2 = 50 W/mK; L_1 = 0.3 m; L_2 = 0.15 m

Assuming negligible contact resistance between the wall surfaces, the interface temperature T (°C) of the two walls will be____.

(A) –0.50 (B) 2.75

(C) 3.75 (D) 4.5

75. Biot number signifies :

(A) the ratio of heat conducted to heat convected

(B) the ratio of heat convected to heat conducted

(C) the ratio of external convective resistance to internal conductive resistance

(D) the ratio of internal conductive resistance to external convective resistance

76. For air near atmospheric condition flowing over a flat plate the laminar thermal boundary layer is thicker than hydrodynamic boundary layer.

(A) True (B) False

(C) Neither True nor False (D) None of the above

77. A diffuse radiation surface has :

(A) radiation intensity independent of angle

(B) emissive power independent of angle

(C) emissive power independent of wavelength

(D) radiation intensity independent of both angle and wavelength

78. In a heat exchanger, it is observed that $\Delta T_1 = \Delta T_2$, where ΔT_1, is the temperature difference between the two single phase fluid streams at one end and ΔT_2, is the temperature difference at the other end. This heat exchanger is ____.

(A) a condenser

(B) an evaporator

(C) a counter flow heat exchanger

(D) a parallel flow heat exchanger

79. The definition of 1K as per the internationally accepted temperature scale is____.

(A) 1/100th the difference between normal boiling point and normal freezing point of water

(B) 1/273.15th the normal freezing point of water

(C) 100 times the difference between the triple point of water and the normal freezing point of water

(D) 1/273.16th of the triple point of water

80. Consider a refrigerator and a heat pump working on the reversed Carnot cycle between the same temperature limits. Which of the following is correct?

(A) COP of refrigerator = COP of heat pump

(B) COP of refrigerator = COP of heat pump +1

(C) COP of refrigerator = COP of heat pump –1

(D) COP of refrigerator = inverse of the COP of heat pump -1

81. At the triple point of a pure substance, the number of degrees of freedom is____.

(A) 0 (B) 1

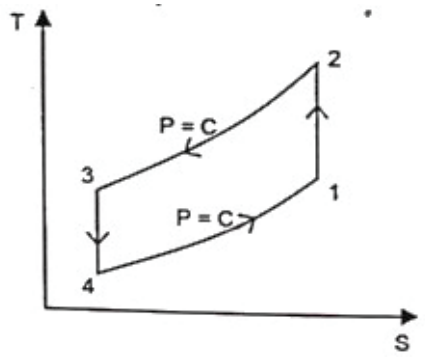
(C) 2 (D) 3

82. In an air-standard Otto cycle, the compression ratio is 10. The condition at the beginning of the compression process is 100 kPa and 27°C. Heat added at constant volume is 1500 kJ/kg, while 700 kJ/kg of heat is rejected during the other constant volume process in die cycle. Specific gas constant for air 0.287 kJ/kg K. The mean effective pressure (in kPa) of the cycle is____.

(A) 103 (B) 310

(C) 515 (D) 1032

83. The thermodynamic cycle shown in the figure (T-s diagram) indicates



(A) reversed Carnot cycle (B) reversed Brayton cycle

(C) vapor compression cycle (D) vapor absorption cycle

84. Alcohols are unsuitable at diesel engine fuels because :

(A) the cetane number of alcohol fuels is very low which prevents their ignition by compression

(B) the cetane number of alcohol fuels is very high which prevents their ignition by compression

(C) the octane number of alcohol fuels is very low which prevents their ignition by compression

(D) none of the above

85. Environment friendly refrigerant $R134_a$ is used in the new generation domestic refrigerators. Its chemical formula is____.

(A) CHC_1F_2 (B) $C_2Cl_3F_3$

(C) $C_2Cl_2F_4$ (D) $C_2H_2F_4$

86. Match the following :

	Group-I		**Group-II**
P.	Sand casting	1.	Turbine blades
Q.	Centrifugal casting	2.	I.C. engine
R.	Investment casting	3.	Large bells
S.	Die casting	4.	Pulleys

(A) P-4, Q-1, R-3, S-2 (B) P-2, Q-4, R-3, S-1

(C) P-3, Q-4, R-1, S-2 (D) P-3, Q-2, R-1, S-4

87. Match the following :

	Welding Process		**Heat Source**
(a)	Thermit welding	1.	Electric arc
(b)	Projection welding	2.	Mechanical work
(c)	MIG welding	3.	Exothermic chemical reaction
(d)	Friction welding	4.	Ohmic resistance

(A) (a)-3 (B) (b)-4

(C) (c)-1 (D) (d)-2

88. Diamond cutting tools are not recommended for machining of ferrous metals due to____.

(A) high tool hardness

(B) high thermal conductivity of the work material

(C) poor tool roughness

(D) chemical affinity of tool material with iron

89. Crater wear always starts at some distance from the tool tip because at that point :

(A) cutting fluid does not penetrate

(B) chip tool interface temp is maximum

(C) normal stress on rake face is maximum

(D) tool strength is minimum

90. Reaming is a process used for :

(A) creating a circular hole in metals

(B) cutting a slot on the existing hole in surface

(C) finishing an existing hole in surface

(D) making non-circular holes in metals

91. In a grinding wheel marked with AA-48-L-7-V-25, L refers to____.

(A) abrasive type (B) wheel structure

(C) wheel hardness (D) manufacturers code

92. The force requirement in a blanking operation of low carbon steel sheet is 5.0 kN. The thickness of the sheet is 't' and diameter of the blanked part is 'd'. For the same work material, if the diameter of the blanked part is increased to 1.5 d and thickness is reduced to 0.4t, the new blanking force in kN is ____.

(A) 3.0 (B) 4.5

(C) 5.0 (D) 8.0

93. Match the processes with their characteristics :

	Process		**Characteristics**
P.	Electrical Discharging Machining	1.	No residual stresses
Q.	Ultrasonic Machining	2.	Machining of electrically conductive materials
R.	Chemical Machining	3.	Machining of glass
S.	Ion Beam Machining	4.	Nano-machining

(A) P-2, Q-3, R-1, S-4 (B) P-3, Q-2, R-1, S-4

(C) P-3, Q-2, R-4, S-1 (D) P-2, Q-4, R-3, S-1

94. Match the following :

	Device		**Function**
P.	Jig	1.	Helps to place work piece in die same position cycle after cycle
Q.	Fixture	2.	Holds the work piece only
R.	Clamp	3.	Holds and position the workpiece
S.	Locator	4.	Holds and position the work piece and guides the cutting tool during a machining operation

(A) P-4, Q-3, R-1, S-2 (B) P-1, Q-2, R-3, S-4

(C) P-1, Q-4, R-3, S-2 (D) P-4, Q-3, R-2, S-1

95. In PERT analysis a critical activity has ____.

(A) maximum float (B) zero float

(C) maximum cost (D) minimum cost

96. Little's law is a relationship between :

(A) stock level and lead time in an inventory system

(B) waiting time and length of the queue in a queuing system

(C) number of machines and job due dates in a scheduling problem

(D) uncertainly in the activity time and project completion time

97. Which one of the following is NOT a decision taken during the aggregate production planning stage?

(A) Scheduling of machines

(B) Amount of labour to be committed

(C) Rate at which production should happen

(D) Inventory to be carried forward

98. Production flow analysis (PA) is a method of identifying part families that uses data from ____.

(A) engineering drawings

(B) production schedule

(C) bill of materials

(D) route sheets

99. Hardenability of steel is a measure of ____.

(A) The depth to which required hardening is obtained when it is austenitized and then quenched

(B) The ability to harden when it is cold worked

(C) The maximum hardness that can be obtained when it is austenitized and then quenched

(D) The ability to retain its hardness when it is heated to elevated temperatures.

100. Engineering strain of a mild steel sample is recorded as 0.100%. The true strain is ____.

(A) 0.010%

(B) 0.055%

(C) 0.099%

(D) 0.101%

ROUCH WORK