Sl. No. :

MEDI

Register Number

2012

MECHANICAL ENGINEERING

Time Allowed : 3 Hours] [**Maximum Marks : 300**

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. This Booklet has a cover (this page) which should not be opened till the invigilator gives signal to open it at the commencement of the examination. As soon as the signal is received you should tear the right side of the booklet cover carefully to open the booklet. Then proceed to answer the questions.

2. This Question Booklet contains **200** questions.

3. Answer **all** questions.

4. **All** questions carry equal marks.

5. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.

6. An Answer Sheet will be supplied to you separately by the invigilator to mark the answers. You must write your Name. Register No.. Question Booklet Sl. No. and other particulars on side 1 of the Answer Sheet provided, failing which your Answer Sheet will not be evaluated.

7. You will also encode your Register Number, Subject Code. Question Booklet Sl. No. etc.. with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, your Answer Sheet will not be evaluated.

8. Each question comprises *four* responses (A). (B). (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.

9. In the Answer Sheet there are **four** brackets [A] [B] [C] and [D] against each question. To answer the questions you are to mark with Ball point pen ONLY ONE bracket of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. *e.g.* If for any item, (B) is the correct answer, you have to mark as follows :

<p style="text-align:center">[A] ■ [C] [D]</p>

10. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. After the examination is concluded, you must hand over your Answer Sheet to the invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.

11. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

12. Do not tick-mark or mark the answers in the Question Booklet.

13. The last sheet of the Question Booklet can be used for Rough Work.

1. Match Henry Fayol's Principle of Management with correct Explanation :

	Principle		**Explanation**
a)	Division of work	1.	Power vested on a single person
b)	Authority	2.	Feeling of harmony
c)	Centralisation	3.	Repetition of work increases quality and quantity
d)	Esprit de corps	4.	Power given to a person to get work from his subordinates

Now select the answer from the codes given below :

Codes :

	a	*b*	*c*	*d*
A)	1	2	4	3
B)	3	4	1	2
C)	1	2	3	4
D)	2	1	3	4.

2. Match **List I** correctly with **List II** and select your answer using the codes given below :

	List I		**List II**
a)	Factory overhead	1.	Sum of direct material & labour cost
b)	Production cost	2.	Expenditure incurred inside the factory
c)	Prime cost	3.	Sum of prime cost & factory overhead
d)	Factory cost	4.	Sum of factory cost & administrative overhead

Codes :

	a	*b*	*c*	*d*
A)	4	3	2	1
B)	1	2	3	4
C)	2	4	1	3
D)	3	4	2	1.

3. Consider the following statements :

   Break-even Point (P) : In order to earn profit the volume of production should be high.

   Reason (R) : The cost of production will be less than the selling price.

   Now select your answer according to the coding scheme given below :

   A) *(P)* is a right statement and *(R)* may be related to *(P)*

   B) *(R)* is the correct reason for *(P)*

   C) *(P)* and *(R)* does not match

   D) None of these.

4. DATA :

Original Machine Value	:	Rs. 30,000
Scrap Value	:	Rs. 6,000
Expected life	:	10 years
Rate of Interest	:	10%

   The amount to be deposited in the bank in the Sinking Fund Method of depreciation using the above data, so that by the end of life of asset, the total depreciated amount will be available in the bank, is

   A) Rs. 1,500 per year   B) Rs. 1,510 per year

   C) Rs. 1,525 per year   D) Rs. 1,505 per year.

5. Which of the following is not as given in *ABC* Analysis ?

   A) Items of stock are listed out

   B) Money value of individual items are found out

   C) Consumption value of the item

   D) A graph is plotted with number items on *x*-axis and money value of items on *y*-axis.

6. DATA :   Demand of item per annum   :   3600

               Procurement cost   :   Rs. 100

               Carrying cost per unit   :   Rs. 2

    The Economic Order Quantity is

    A)   6000 units   B)   600 units

    C)   60 units   D)   6 units.

7. Father of Industrial engineering is

    A)   Jeck Gilberth   B)   Gantt

    C)   Taylor   D)   Newton.

8. The production cost per unit can be reduced by

    A)   producing more with increased inputs

    B)   producing more with the same inputs

    C)   eliminating idle time

    D)   minimising resource waste.

9. .... is/are independent of sales forecast.

    A)   Productivity   B)   Capital budgeting

    C)   Production, planning and control   D)   Inventory control.

10. The depreciation calculated by which of the following methods would be maximum ?

    A)   Straight line method   B)   Sinking fund method

    C)   Diminishing balance method   D)   Sum of year digits method.

11. The size of site is to be at least .... times the actual size of the plant.

    A)   two   B)   four

    C)   five   D)   seven.

12. Detention of cost competitiveness is the function of

   A) Methods Engineering
   B) Finance Department
   C) Production Planning and Control
   D) Personal Management.

13. Under the Halsey system, a worker can double his wages if he completes the job in

   A) allowed time
   B) $\frac{1}{2}$ of allowed time
   C) $\frac{1}{3}$ rd of alowed time
   D) $\frac{1}{4}$ th of allowed time.

14. The present rate of minimum bonus is

   A) 4%
   B) 8·33%
   C) 20%
   D) none of these.

15. Consider the following statements :

   I. 'Owned Capital' is raised through issue of shares.

   II. 'Borrowd Capital' is raised through debentures.

   Of these

   A) only I is correct
   B) only II is correct
   C) both I and II are correct
   D) both are wrong.

16. Routing is essential in which of the following types of industry ?

   A) Assembly industry
   B) Process industry
   C) Job order industry
   D) Mass production industry.

17. Stop watch is not needed for

   A) man-machine chart
   B) SIMO chart
   C) R-chart
   D) Micro-motion study.

18. The determination of standard time in a complex job system is best done through

   A) stop watch time study
   B) analysis of micromotions
   C) grouping timing technique
   D) analysis of standard data system.

19. String diagram is used when

    A) team of workers is working at a place

    B) material handling is to be done

    C) idle time is to be reduced

    D) all of these.

20. Which control chart deals with the dimensions of products which are nearer to the required dimension ?

    A) $\bar{X}$ -chart

    B) R-chart

    C) P-chart

    D) C-chart.

21. Which among the following is not an advantage of Statistical Quality Control ?

    A) The operators are not disturbed

    B) Reduction of Scrap and Re-work

    C) Time and Cost of Inspection is reduced

    D) Product design can be improved.

22. Which of the following is not connected to the procedure for conducting stop watch time study ?

    A) Selecting the job

    B) Breaking operation into elements

    C) Assessing the rating factor

    D) Production study.

23. Study the following and find which of the following statements is not an application of string diagram :

    I. Used for recording the complex movements of material or men.

    II. Used to record irregular movements.

    III. Used to find out the most economical route.

    IV. Backtracking, congestion are easily found out.

    Select the answer from the coding given below :

    A) I and II

    B) III and IV

    C) All are applications of string diagram

    D) I, III and IV.

24. The general guidelines for making a flow process chart for a right hand-left hand chart are

    I.   Provide all information about the job in the chart.

    II.   Study the operation cycle more than once before recording

    III. Record one hand at a time.

    IV.   Do not combine the different activities like operation, transport etc.

    Of these

    A)   I, II and III are correct

    B)   II, III and IV are correct

    C)   All the four statements are correct

    D)   I and IV are correct.

25. Which among the following is not the basic procedure for Method study ?

    A)   Select the work to be studied

    B)   Define the new method

    C)   Instal the old method

    D)   Maintain the new method of regular checking.

26. Template is one of the methods in techniques of improving plant layout. Which among the following is not an advantage of 2-dimensional templates ?

    A)   Non-technical people cannot understand easily

    B)   They are cheaper

    C)   Duplicate copies can be made

    D)   Best arrangement is selected.

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27. Match **List I** correctly with **List II** and select your answer using the codes given below :

List I

a) Principle of Integration

b) Principle of Material flow

c) Principle of Safe Environment

d) Principle of Flexibility

List II

P. Changes can be made with less disturbance

Q. Increases Employer and Employee relationship

R. Free flow of things

S. Arrangement of production unit in a logical manner.

Codes :

	a	b	c	d
A)	S	R	Q	P
B)	S	P	R	Q
C)	P	S	Q	R
D)	P	Q	R	S.

28. Which among the following is not an objective of job evaluation ?

A) Decides the relative value of different jobs

B) Helps fix correct wage structure

C) Provides a base for recruitment

D) Decides the intelligence of an employee.

29. The correct sequence of a simple form of organisation is

A) General Manager, Superintendent, Works Manager, Supervisor, Workers

B) Works Manager, General Manager, Supervisor, Superintendent, Workers

C) Superintendent, Workers, Works Manager, Supervisor, General Manager

D) General Manager, Works Manager, Superintendent, Supervisor, Workers.

30. A worker uses a defective ladder. He climbed carefully but coming down he forgot the defect and fell down.

The cause(s) is / are

    I.   Use of defective ladder by the worker

    II.   Carelessness while getting down

    III. Defect in the ladder

    IV. Presence of the defective ladder in the workplace.

Which among the above is a primary cause of accident ?

A) I alone   B) IV alone

C) II and III   D) All of these.

31. Which of the following is gear finishing process ?

A) Gear shaving   B) Gear hobbing

C) Gear shaping   D) Gear milling.

32. Finish is more affected by

A) cutting speed   B) depth of cot

C) feed rate   D) lubricant.

33. During machining the blunt abrasive grains are released from the grinding wheel surface and is replaced by new abrasive grains. This is called

A) Self sharpening of the grinding wheel

B) Replacement of the grinding wheel

C) Sticking of new abrasives

D) Dusting of the grinding wheel.

34. Characteristics of metal power :

   I.   Purity

   II. Particle shape

   III. Flowability

   IV. ?

   Identify the IVth characteristic from the following :

   A) Chemical composition   B) Roughness

   C) Stability   D) Resistability.

35. Which among the following is not correct ?

   A) Work holding device — Chuck

   B) Carriage   — Consists of saddle. cross slide etc.

   C) Tailstock   — Mounted on the bedway

   D) Feed Mechanism   — Movement of work relative to the tool.

36. Match **List I** correctly with **List II** and select your answer using the codes given below :

List I (Types of pattern)		List II (Description)
a)	Solid pattern	1. Uses a single match plate, its one side has cope impression and other side has drag impression
b)	Match plate pattern	2. Made in one piece
c)	Cope and drag pattern	3. Used for small size casting in large numbers
d)	Gated pattern	4. Uses two match plates.

   Codes :

	a	b	c	d
A)	2	1	4	3
B)	2	4	1	3
C)	3	1	4	2
D)	2	4	1	3.

37. Which of the following joining methods does not use filler metal ?

    A) Gas welding   B) Arc welding

    C) Resistance welding   D) Soldering.

38. Cold working of metals is carried out

    A) below the recrystallisation temperature

    B) at the recrystallisation temperature

    C) above the recrystallisation temperature

    D) working temperature depends upon physical conditions of the workpiece.

39. Powder metallurgy uses

    A) pressure   B) heat

    C) pressure and heat   D) no pressure.

40. In a mechanical shaper. the length of stroke is increased by

    A) increasing the centre distance of bull gear and crank pin

    B) decreasing the centre distance of bull gear and crank pin

    C) increasing the length of the ram

    D) decreasing the length of the slot in the slotted lever.

41. Consider the following statements about planning :

    I.   Larger workpieces can be machined

    II.   More numbers of cutting ends can be used simultaneously

    III. It works on the principle of slotted link mechanism

    IV.   It produces more accurate surfaces.

    Of these statements :

    A) I. II. III and IV are true   B) II. III and IV are true

    C) III and IV are true   D) I and II are true.

42. The objective of heat treatment is to change

    I.   physical properties of a metal

    II.   magnetic properties of a metal

    III. electrical properties of a metal

    IV. mechanical properties of a metal.

Of these statements :

A) I is true   B) II and III are true

C) IV is true   D) III and IV are true.

43. Honing operation is used to

A) harden a surface

B) finish holes

C) provide a very close fit between two contact surfaces

D) remove the grinding and tool marks left by previous operation.

44. Gear cutting on a milling machine using an involute profile cutter is a

A) gear forming process

B) gear generating process

C) gear shaping process

D) highly accurate gear producing process.

45. Operation of cutting a flat sheet to the desired shape is known as

A) perforating   B) blanking

C) notching   D) forming.

46. Blanking and piercing operation can be carried out simultaneously in a

A) simple die   B) compound die

C) progressive die   D) combination die.

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47. Consider the following statements regarding numerically controlled machine tools :

    I.   They reduce non-productive time

    II.   They reduce fix turning

    III. They reduce maintenance cost.

Which of these statements are correct ?

A)   I, II and III   B)   I and II

C)   II and III   D)   I and III.

48. Select the correct maching :

A)   Wood   —   Longer life

B)   Metal   —   Easy to work on

C)   Plaster   —   High compressive strength

D)   Waxes   —   Less accurate and finish

49. Which welding process is a type of Gas welding ?

A)   Metal Inert Gas   B)   Tungsten Inert Gas

C)   Oxy-acetylene   D)   Electro-slag.

50. Rolling is done on metal at room temperature or at a temperature below the recrystallisation temperature is a type of

A)   Hot Rolling   B)   Cold Rolling

C)   Forging   D)   None of these.

51. Which one of the following is a type of Resistance welding ?

A)   Oxy-hydrogen   B)   Submerged arc

C)   Seam welding   D)   Friction welding.

52. The process of joining 2 similar or dissimilar metals by a fusible alloy called spelter. This method of joining the metals is

A)   Brazing   B)   Soldering

C)   Thermit welding   D)   Friction welding.

53. The welding process in which 2 metal surfaces are brought together with high relative velocity under a heavy pressure is

   A) Diffusion welding
   B) Thermit welding
   C) Explosive welding
   D) Friction welding.

54. The green compact is heated just below the melting point in a controlled atmosphere. The process is called

   A) Heating
   B) Melting
   C) Sintering
   D) Brazing.

55. Which among the following are the mechanical properties of parts made by powder metallurgy process ?

   I.   Strength
   II. Ductility
   III. Hardness
   IV. Brittleness.

   Of these

   A) I, II, III
   B) II, III, IV
   C) III, IV
   D) I, II.

56. It is attached to the saddle and hangs in front of the bed. It has gears, levers, and clutches.

   The above explanation is about

   A) Gear box
   B) Back geared head stock
   C) Apron
   D) Carriage.

57. It is similar to a shaper. Work is held on a stationary table. The tool reciprocates over the work for cutting.

   What type of planer is discussed above ?

   A) Double housing planer
   B) Open side planer
   C) Pit planer
   D) Edge planer.

58. Module of a gear is

   A) the product of pitch circle diameter and number of teeth
   B) the reciprocal of pitch circle diameter
   C) the ratio of number of teeth to pitch circle diameter
   D) the ratio of pitch circle diameter to the number of teeth.

59. Which one of the following is classified as a surface grinder machine ?

 A) Rotary table-vertical spindle   B) Multihead type

 C) Planer type   D) Floor type.

60. Powder metallurgy techniques are used in the production of

 A) high carbon tool steels   B) HSS tools

 C) tungsten carbide tools   D) ceramics.

61. The arbor of the milling machine is used to hold

 A) cutting tool   B) spindle

 C) overarm   D) mandrel.

62. Quick return mechanism is used in

 A) shaper   B) milling machine

 C) broaching machine   D) grinding machine.

63. Process of producing components by pouring molten metal into a mould cavity and allowing to solidify is called

 A) Foundry   B) Casting

 C) Melting   D) Pouring.

64. Full model of the required component used to make the mould cavity in sand is called

 A) Foundry   B) Pattern

 C) Casting   D) Moulding.

65. Type of moulding suitable for objects having surfaces of revolution and are axi-symmetrical is

 A) floor moulding   B) bench moulding

 C) pit moulding   D) sweep moulding.

66. Process of casting metals in permanent moulds made of metals is called

 A) green sand casting   B) dry sand casting

 C) die casting   D) none of these.

67. Plastic deformation of metals which are carried out above their recrystallization temperature is called

A) cold working

B) hot working

C) normal working

D) none of these.

68. In an automatic welding machine increasing the electrode speed will

A) increase the voltage

B) decrease the voltage

C) keep the voltage constant

D) fluctuate the voltage.

69. DVAC is the abbreviation for

A) Dropping Volt Ampere Characteristics

B) Dropping Voltage Air-Conditioning

C) Different Voltage Air-Conditioning

D) None of these.

70. The father of machine tools is

A) Lathe

B) Motor

C) Drilling machine

D) Vice.

71. The part of the lathe with circular base graduated in degrees used to have taper turning to a small length by manual feeding is

A) Tool post

B) Cross slide

C) Compound rest

D) Carriage.

72. Swaging is an operation of

A) Hot rolling

B) Forging

C) Extrusion

D) Piercing.

73. Hot working operation is carried at

A) recrystallisation temperature

B) near plastic stage temperature

C) below recrystallisation temperature

D) above recrystallisation temperature.

74. In drawing operations the metal flows due to

A) Ductility

B) Work hardening

C) Plasticity

D) Shearing.

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75. Continuous chips will be formed when machining speed is

   A) high
   B) low
   C) medium
   D) irrespective of cutting speed.

76. The universal gates are

   A) NAND and AND
   B) NAND and OR
   C) OR and NOR
   D) NAND and NOR.

77. Which of the following is the poorest conductor of electricity ?

   A) Silver
   B) Copper
   C) Aluminium
   D) Carbon.

78. A parallel a.c. circuit in resonance will

   A) have high impedance
   B) generate maximum noise
   C) generate maximum heat
   D) generate maximum power.

79. Match the units in **List-I** with their names in **List-II** using the codes given below :

	List-I		List-II
a)	Frequency	1.	ohm
b)	Resistance	2.	hertz
c)	Capacitance	3.	lux
d)	Illumination	5.	farad.

   Codes :

	a	b	c	d
A)	1	4	3	2
B)	2	1	4	3
C)	4	1	2	3
D)	3	2	1	4.

80. A D.C. motor can be easily identified by

   A) winding
   B) commutator
   C) size of conductor
   D) yoke.

81. Laminated cores, in electric machines are used to reduce

    A) copper loss   B) Eddy current loss

    C) hysteresis loss   D) all of these.

82. In an Induction motor, the percentage slip depends on

    A) supply frequency   B) supply voltage

    C) copper losses in motor   D) none of these.

83. Which of the following is an example of an active device ?

    A) Transformer   B) Silicon Controlled Rectifier (SCR)

    C) Electric bulb   D) None of these.

84. The output frequency of a full-wave rectifier is

    A) same as the input frequency   B) one-half of the input frequency

    C) double of the input frequency D) none of these.

85. The most widely used insulation material is

    A) mica   B) rubber

    C) PVC   D) cork.

86. An induction motor is identical to

    A) d.c. compound motor   B) d.c. series motor

    C) synchronous motor   D) asynchronous motor.

87. A device used to change A.C. current to d.c. current and at the same time controls the amount of power supply fed to the load is

    A) Transistor   B) Amplifier

    C) Silicon Controlled Rectifier   D) Vacuum Tube Voltmeter.

88. A sine wave has a frequency of 50 Hz. Its angular velocity is .... radian/second.

    A) $50/\pi$ B) $50/2\pi$

    C) 50π D) 100π.

89. Kirchhoff's voltage law is concerned with

    A) IR drops   B) battery emfs

    C) junction voltages   D) both (A) and (B).

90. The unit of capacitance is

    A) farad   B) coulomb

    C) volt   D) ohm.

91. A universal joint allows the propeller shaft to

    A) change inclination   B) change length

    C) bend side ways   D) transfer torque at an angle.

92. Consider the following statements :

    Assumption (S) :   In the theory of assumptions it is assumed that the beam is
                         made up of homogeneous material and isotropic.

    Reason (R) :   It possesses the same elastic property in all directions.

    Now select your answer according to the coding scheme given below :

    A) *(S)* is correct, but *(R)* is not the right reason

    B) Both *(S)* and *(R)* are of different topics

    C) *(R)* is the correct reason of *(S)*

    D) *(R)* may be a reason for *(S)*.

93. In .... gear tooth thickness changes along its length.

    A) Spur   B) Helical

    C) Bevel   D) Spiral.

94. Bending moment at any point is equal to the algebraic sum of

    A) all vertical forces

    B) all horizontal forces

    C) forces on either side of the point

    D) moments of forces on either side of the point.

95. Point of contraflexure occurs in

    A) simply supported beam   B) cantilevers

    C) overhanging beam   D) none of these.

96. Bulk modulus K in terms of modulus of elasticity E and Poisson's ratio μ is given as equal to

    A) $\dfrac{E}{3(1-2\mu)}$ B) $E(1-2\mu)$

    C) $3E(1-2\mu)$ D) $\dfrac{E}{3}(1+2\mu)$.

97. Moment of inertia of a body does not depend upon

    A) angular velocity of the body   B) mass of the body

    C) distribution of mass in the body D) axis of rotation of body.

98. The centre of gravity of a uniform lamina lies at

    A) the centre of heavy portion   B) the bottom surface

    C) the mid-point of its axis   D) none of these.

99. The maximum Bending moment of a simply supported beam of span l carrying a point load W at the mid-space is

    A) $\dfrac{Wl}{2}$ B) $\dfrac{Wl^2}{4}$

    C) $\dfrac{Wl}{4}$ D) $\dfrac{Wl^2}{2}$.

100. At what distance the centroid of a semi-circular lamina of radius r is located from its centre of arc ?

    A) $\dfrac{4r}{3\pi}$ B) $\dfrac{3r}{4\pi}$

    C) $\dfrac{r}{3}$ D) $\dfrac{r}{2}$.

101. The point through which the resultant of the system of parallel forces formed by the weights of all the particles of the body passes, for all the position of the body is called

    A) Geometric centre   B) Centre of gravity

    C) Centre of area   D) None of these.

102. The unit of compressive strain is

    A) N/mm^2 B)   cm

    C)   m   D)   none of these.

103. Toughness of a material signifies

    A)   softening   B)   strength

    C)   brittleness   D)   fatigue resistance.

104. Two wires of different materials but of same diameter & length are connected at both ends and a force is applied which stretches them by 0·5 mm. The two wires will have the

    A)   same stress and different strains

    B)   same stress and strain

    C)   different stresses and strains

    D)   same strain, but different stresses.

105. The design of a thin cylindrical shell is based on

    A)   diameter of the shell   B)   internal pressure

    C)   longitudinal stress   D)   all of these.

106. When a closed coil helical spring is subjected to an axial load, its axial deflection is directly proportional to

    A)   number of coils in the spring

    B)   diameter of the wire

    C)   shear modulus

    D)   mean radius of the coil of the spring.

107. A pulley of 300 mm diameter drives a pulley 1500 mm in diameter by means of a belt drive. If the driver pulley turns 350 r.p.m., the speed of the driven pulley would be

    A)   70 r.p.m.   B)   120 r.p.m.

    C)   1200 r.p.m.   D)   1750 r.p.m.

108. Identify the correct statements using the codes given below for chain drive :

    I.   Gradual stretching of chains is necessary to remove of its link from time to time.

    II.   No slip takes place.

    III. It takes less space than a belt or rope drive.

Codes :

A)   I and II   B)   II and III

C)   I and III   D)   I, II and III.

109. Match **List I** correctly with **List II** and select your answer using the codes given below :

	List I			List II
a)	Elasticity		1.	Ability of the material to undergo some degree of permanent deformation
b)	Plasticity		2.	Ability to withstand both plastic and elastic deformations
c)	Toughness		3.	Ability of a material to be drawn into a thin wire
d)	Ductility		4.	Virtue of which deformation caused by applied load disappears upon removal of load.

Codes :

	a	*b*	*c*	*d*
A)	1	2	4	3
B)	4	1	2	3
C)	1	2	3	4
D)	4	3	2	1.

110. The resistance offered by each and every cross-section to the increase in length is called

A)   Tensile stress   B)   Strain

C)   Compressive stress   D)   Stress.

111. Data : Pull : (P)   : 10 kN

           Length of rod   : 2 m

           Diameter of rod (d)   : 25 mm

           Rod extends under pull (δl)   : 0·2 mm.

    The value of strain is

    A) 0·00025   B) 0·0001

    C) 0·001   D) 0·0015.

112. It is the stress at which there is sudden increase in strain without any appreciable increase in stress.

    It is known as

    A) ultimate stress   B) breaking stress

    C) working stress   D) yield point.

113. Hoop stress is

    A) $\dfrac{\text{Total pressure}}{\text{Resisting section}}$ B) $\dfrac{\text{Load}}{\text{Area}}$

    C) $\dfrac{\text{Change in length}}{\text{Original length}}$ D) $\dfrac{\text{Force}}{\text{Area}}$.

114. A cantilever is

    A) a beam which rests freely on two end supports

    B) a beam whose one end is fixed while the other end is free

    C) a simply supported beam which extends beyond the supports

    D) a beam which has more than two supports.

115. Consider the following statements :

    Assertion (A) : Iso-octane has been chosen as the reference for SI engine fuels and has been assigned a value of octane number 100.

    Reason (R) : Among the fuels, iso-octane ensures, the highest compression ratio at which an SI engine can be operated without knocking.

    Now select your answer according to the coding scheme given below :

    A) Both *(A)* and *(R)* are true and *(R)* is the correct explanation of *(A)*

    B) Both *(A)* and *(R)* are true, but *(R)* is not the correct explanation of *(A)*

    C) *(A)* is true, but *(R)* is false

    D) *(A)* is false, but *(R)* is true.

116. Consider the following statements :

Assertion (A) : On the psychrometric chart, constant enthalpy lines and constant wet bulb lines are the same.

Reason (R) : For the same wet bulb temperature, the moisture content remains constant.

Now select your answer according to the coding scheme given below :

A) Both (A) and (R) are true and (R) is the correct explanation of (A)

B) Both (A) and (R) are true, but (R) is not the correct explanation of (A)

C) (A) is true, but (R) is false

D) (A) is false, but (R) is true.

117. For a multistage compressor, the polytropic efficiency is

A) the efficiency of all stages combined together

B) the efficiency of one stage

C) constant throughout for all stages

D) a direct consequence of the pressure ratio.

118. Match **List I** correctly with **List II** and select your answer using the codes given below :

List I		List II	
a)	Carnot	1.	Efficiency depends upon cut-off ratio and compression ratio
b)	Brayton	2.	Efficiency depends upon volume and compression ratio
c)	Otto	3.	Efficiency depends only upon pressure ratio
d)	Diesel	4.	Efficiency depends only upon temperature limits

Codes :

	a	b	c	d
A)	4	3	2	1
B)	3	4	1	2
C)	4	2	3	1
D)	3	2	1	4.

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[Turn over

119. During adiabatic cooling of moist air

    A) DBT remains constant

    B) specific humidity remains constant

    C) relative humidity remains constant

    D) WBT remains constant.

120. Consider the following statements :

    Assertion (A) : Use of higher steam pressures in power plants has increased pollution.

    Reason (R) : High capacity steam plant burns more quantity of fuel.

    Now select your answer according to the coding scheme given below :

    A) Both *(A)* and *(R)* are true and *(R)* is the correct explanation of *(A)*

    B) Both *(A)* and *(R)* are true, but *(R)* is not the correct explanation of *(A)*

    C) *(A)* is true, but *(R)* is false

    D) *(A)* is false, but *(R)* is true.

121. A steam trap is used to

    A) add moisture of steam

    B) condense the steam

    C) separate the condensate from steam

    D) superheat the steam.

122. Which of following processes is not associated with diesel cycle ?

    A) Constant volume   B) Constant pressure

    C) Isothermal   D) Adiabatic.

123. Which of the following is the boiler mounting ?

    A) Blow-off cock   B) Feed pump

    C) Economiser   D) Superheater.

124. An economiser is fitted with a boiler to

    A) increase the steam pressure

    B) heat the fuel of low calorific value

    C) heat the air entering the fire grate

    D) heat the feed water by exhaust flue gases.

125. Which of the following form part(s) of boiler mountings ?

    I.   Economiser

    II. Feed check valve

    III. Steam trap

    IV. Superheater.

    Select the correct answer using the codes given below :

    A) II only   B) I and III

    C) II, III and IV   D) All.

126. What changes occur in pressure and velocity when steam flows through the second row of moving blades of a velocity compounded impulse turbine ?

    A) Velocity decreases and pressure remains constant

    B) Pressure decreases and velocity remains constant

    C) Both velocity and pressure remain constant

    D) Both velocity and pressure decrease.

127. During which process of vapour compression refrigeration system, the enthalpy remains constant ?

    A) Condenser   B) Throttle valve

    C) Evaporator   D) Compressor.

128. A valve which maintains a constant degree of superheat at the end of the evaporator coil is called

    A)   automatic expansion valve

    B)   thermostatic expansion valve

    C)   high side float valve

    D)   low side float valve.

129. The process generally used for summer air-conditioning is

    A)   cooling with humidification

    B)   cooling with dehumidification

    C)   adiabatic cooling

    D)   chemical dehumidification.

130. The basic requirement(s) of fuel injection in compression ignition engines is/are

    A)   accurate metering and proper atomization of fuel

    B)   proper timing and suitable rate of fuel injection

    C)   proper distribution of atomised fuel in combustion chamber

    D)   all of these.

131. Air standard efficiency of Otto cycle is

    A)   work done / heat supplied

    B)   heat supplied – heat rejected

    C)   heat supplied / work done

    D)   heat rejected – heat supplied.

132. The fourth stage in the working of an Otto cycle is

    A)   Adiabatic compression

    B)   Adiabatic expansion

    C)   Constant volume heat rejection

    D)   Constant volume heat addition.

133. In the working of Diesel cycle the point of cut-off happens in

    A) first stage   B) ✓ second stage

    C) third stage   D) fourth stage

134. The flywheel in a two-stroke cycle engine when compared with four-stroke cycle engine is

    A) heavier   B) equal in weight

    C) ✓ lighter   D) none of these.

135. Which of the following is/are effect(s) of clearance volume ?

    I.   Volumetric efficiency is reduced

    II.   Mass of air induced is reduced

    III. Actual air admitted is reduced

    IV.   Increased clearance volume results in heavy compression.

    Choose your answer according to the coding :

    A) I only   B) II and III

    C) ✓ All of these   D) III and IV.

136. Which among the following circuits about the working of a steam power plant is not correct ?

    A) Fuel and ash circuit

    B) Air and flue gas circuit

    C) ✓ Hot water and fuel circuit

    D) Cooling water flow circuit.

137. Requirement(s) of nuclear fuels :

  I.   Undergo fission process

  II. High tensile strength to bear thermal stresses

  III. High radiation stability

  IV. Low conductivity and lesser ductility.

  Which of the above is not true ?

  A)   I, II, III   B)   II, III, IV

  C)   II alone   D)   IV alone.

138. The function of control rods in nuclear plant is to

  A)   control temperature   B)   control radioactive pollution

  C)   control absorption of neutron   D)   control fuel consumption.

139. Power impulses from an IC engine are smoothed out by

  A)   Governor   B)   Crankshaft

  C)   Gear box   D)   Flywheel.

140. Hot flue gases are passed through tubes which are immersed in water in the case of

  A)   fire-tube boiler   B)   water-tube boiler

  C)   natural draught boiler   D)   none of these.

141. Cooling water circuit is employed in a steam power plant to

  A)   condensate the exhaust steam from turbine

  B)   cool the feed water

  C)   superheat the steam

  D)   cool the flue gases at the chimney.

142. A steam power plant must have the engine or turbine to

    A) produce heat energy from hydraulic power

    B) produce hydropower from heat energy

    C) convert heat energy into mechanical work

    D) rotate a motor.

143. The components of the boiler intalled to increase the efficiency of the boiler plants are called as

    A) mountings   B) accessories

    C) feeders   D) tools.

144. Maximum work is done in compressing air when the compression is

    A) isothermal   B) adiabatic

    C) polytropic   D) none of these.

145. The quantity of heat extracted from a cold body or space to be cooled in a given time is called

    A) refrigerating effect   B) COP

    C) actual COP   D) relative COP.

146. The air standard efficiency of an Otto cycle compared to diesel cycle for the given compression ratio is

    A) same

    B) less

    C) more

    D) more or less depending upon power rating.

147. Which of the following can be used as a coolant in nuclear plant ?

    A) Light or heavy water   B) Molten lead

    C) Any form of uranium   D) Carbon dioxide.

148. The efficiency of diesel cycle with decrease in cut-off

    A) increases

    B) decreases

    C) remains unaffected

    D) first increases and then decreases.

149. Which of the following cycles has maximum efficiency ?

    A) Rankine   B) Stirling

    C) Carnot   D) Brayton.

150. De Laval turbine is

    A) a hydraulic impulse turbine   B) a hydraulic reaction turbine

    C) a steam impulse turbine   D) a gas turbine.

151. The engine which gives one power stroke for every revolution of the crankshaft is

    A) two-stroke cycle engine   B) four-stroke cycle engine

    C) low-speed engine   D) wet-sump engine.

152. The engine which gives one power stroke for two revolutions of the crankshaft is

    A) two-stroke cycle engine   B) four-stroke cycle engine

    C) high speed engine   D) wet sump engine.

153. Specific humidity is

    A) $\dfrac{\text{mass of water vapour}}{\text{mass of dry air}}$ B) $\dfrac{\text{mass of water vapour}}{\text{mass of wet air}}$

    C) $\dfrac{\text{mass of water vapour}}{\text{mass of water}}$ D) none of these.

154. In BHEL high pressure boilers, the feed pump supplies the water to the boiler drum through

    A) Air pre-heater I   B) Air pre-heater II

    C) Economiser   D) Convective super-heater.

155. Work done during polytropic process is generally expressed as

A) $\dfrac{P_1 V_1 - P_2 V_2}{n-1}$

B) $\left(h_2 - h_1 \right) + \dfrac{n}{n-1} \left(P_1 V_1 - P_2 V_2 \right)$

C) $\dfrac{P_1 V_1}{T_1}$

D) $P_1 V_1^n = P_2 V_2^n$.

156. The ratio of specific heats of gas at constant pressure and at constant volume

A) varies with temperature   B) varies with pressure

C) is always constant   D) none of these.

157. Atmospheric pressure is

A) 10^6 bar   B) 2 bar

C) 1·01325 bar   D) 1·5 bar.

158. In reversible adiabatic process, term $\dfrac{P_1 V_1 - P_2 V_2}{\gamma - 1}$ is equal to

A) polytropic index

B) $\dfrac{T_1}{T_2}$

C) heat absorbed or rejected

D) work done during adiabatic expansion.

159. Which of the following is not an internal combustion engine ?

A) 2-stroke petrol engine   B) diesel engine

C) gas turbine   D) steam turbine.

160. .... are used to transfer the information into the computing machine.

A) Output devices   B) Input devices

C) Transducers   D) Semi-conductors.

161. What does symbol ◇ imply in flow-chart ?

   A)   Input / output   B)   Process

   C)   Terminal   D)   Decision.

162. Working principle of a computer :

   I.   For a computer to function a set of instructions are to be fed.

   II.   'As the computer starts, it picks data from the memory.

   III. The language in which a computer processes data with 0 and 1 is
         known as machine language.

   Answer according to the coding scheme below :

   A)   I, II, III are correct

   B)   I, III are correct, but II is partially correct

   C)   All the statements are true

   D)   I, II are true, but III is false.

163. Any information or data is stored in the memory in the form of

   A)   Decimal number   B)   Binary digits

   C)   Hexadecimal number   D)   Octal number.

164. Secondary storage in a computer is also called as

   A)   Main memory   B)   Temporary memory

   C)   Auxiliary memory   D)   Read only memory.

165. Which among the following statements is not connected with RAM ?

   A)   Forms major part of the main memory

   B)   Read/Write memory

   C)   Storage is permanent

   D)   Has complicated circuitry.

166. Which one of the following printers uses impact technique ?

    A)   Thermal Matrix Printer   B)   Daisy Wheel Printer

    C)   Ink-Jet Printer   D)   Laser Printer.

167. VDU in a computer system refers to

    A)   Video Display Unit   B)   Visual Display Unit

    C)   Vertical Display Unit   D)   Variety Display Unit.

168. Which one of the following is not a main memory in computers ?

    A)   Magnetic core memory   B)   Semi-conductor memory

    C)   Magnetic tape   D)   Winchester disk.

169. RAM in computer is an acronym of

    A)   Read Access Memory   B)   Random Access Memory

    C)   Random Available Memory   D)   Read All Memory.

170. Which among the following is not a type of Draft tube ?

    A)   Conical or divergent tube

    B)   Hydracone or divergent draft tube

    C)   Elbow type draft tube

    D)   Multiple type draft tube.

171. Which of the following turbines is most efficient at part load operations ?

    A)   Kaplan   B)   Propeller

    C)   Francis   D)   Pelton wheel.

172. Slip of a reciprocating pump is negative. when

    A)   suction pipe is short and pump is running at low speeds

    B)   delivery pipe is long and pump is running at high speeds

    C)   suction pipe is short and delivery pipe is long and the pump is running at low speeds

    D)   suction pipe is long and delivery pipe is short and the pump is running at high speeds.

173. Which of the following pumps is successfully used for lifting water from deep wells ?

    A)   Centrifugal pump   B)   Reciprocating pump

    C)   Jet pump   D)   Air lift pump.

174. If the Reynolds number is less than 2000, the flow in a pipe is

    A)   laminar flow   B)   turbulent flow

    C)   transition flow   D)   none of these.

175. The total energy represented by the Bernoulli's equation $\left(\dfrac{P}{W} + \dfrac{V^2}{2g} + Z \right)$ has the unit

    A)   Nm/s   B)   Ns/m

    C)   Nm/m   D)   Nm/N.

176. Which of the following has no unit ?

    A)   Kinematic viscosity   B)   Surface tension

    C)   Bulk modulus   D)   Strain.

177. The force exerted (in newton) by a jet of water impinging normally on a fixed plate is (w = specific weight of water in N/m^3, a = cross-sectional area of jet in m^2, and v = velocity of jet in m/s.)

    A) $\dfrac{wav}{2g}$ B) $\dfrac{wav}{g}$

    C) $\dfrac{wav^2}{2g}$ D) $\dfrac{wav^2}{g}$.

178. The hydraulic efficiency of an impulse turbine is maximum when velocity of wheel is

    A)   one-fourth   B)   one-half

    C)   three-fourth   D)   double.

179. Rotameter is a device used to measure

   A)   absolute pressure   B)   velocity of fluid

   C)   flow   D)   rotation.

180. Pitot tube is used for measurement of

   A)   pressure   B)   flow

   C)   velocity   D)   discharge.

181. kPa is the unit of

   A)   fluid pressure   B)   load

   C)   force   D)   density.

182. Parson's turbine is

   A)   simple reaction type turbine

   B)   simple impulse type turbine

   C)   velocity compounded turbine

   D)   none of these.

183. In a reaction turbine the function of a draft tube is to

   A)   provide safety to turbine

   B)   prevent air from entering

   C)   reconvert the kinetic energy to flow energy

   D)   increase the rate of flow.

184. The specific speed of a turbine is expressed as

   A) $\dfrac{N\sqrt{P}}{H}$ B) $\dfrac{N\sqrt{P}}{H^2}$

   C) $\dfrac{N\sqrt{P}}{H^{3/4}}$ D) $\dfrac{N\sqrt{P}}{H^{5/4}}$

185. Suitable for measuring flow of fluids through smaller pipes is

   A)   Venturimeter   B)   Orifice meter

   C)   Piezometer   D)   Manometer.

186. Which of the following is not a rotary pump ?

    A) Gear   B) Vane

    C) Screw   D) Axial.

187. Formula for finding the difference of pressure in two pipes at same level carrying different liquids of specific gravities S_1 and S_2 using differential manometer having mercury of specific gravity of S_3 is

    A) $h_A - h_B = h_2 S_2 + h_3 S_3 - h_1 S_1$

    B) $h_A - h_B = h_2 (S_2 - S_1)$

    C) $h_A - h_B = h_2 S_2 + h_1 S_1$

    D) $h_A - h_B = h_2 (S_1 - S_2)$.

188. Draft tube increases the efficiency of

    A) Impulse turbines   B) Inpulse hydraulic turbines

    C) Reaction hydraulic turbines   D) none of these.

189. Francis turbine is a

    A) hydraulic reaction turbine   B) hydraulic impulse turbine

    C) steam axial flow turbine   D) gas turbine.

190. Kaplan turbine is fitted with

    A) conical draft tube   B) elbow draft tube

    C) Moody's draft tube   D) none of these.

191. Which of the following manometers has highest sensitivity ?

    A) U-tube with water   B) Inclined U-tube

    C) U-tube with mercury   D) Micromanometer with water.

192. The specific speed of a water turbine is expressed as

    A) $N_s = \dfrac{N \sqrt{P}}{H^{5/4}}$ B) $N_s = \dfrac{N \sqrt{P/C}}{H^{5/4}}$

    C) $N_s = \dfrac{N \sqrt{P}}{(gH)^{5/4}}$ D) $N_s = \dfrac{N \sqrt{P/C}}{(gH)^{5/4}}$.

193. Match **List I** correctly with **List II** and select your answer using the codes given below :

| | **List I** | | | **List II** |
| | **(Symbol)** | | | **(Description)** |

a)   1.   Double acting cylinder

b)   2.   Reservoir

c)   3.   Heat exchanger

d)   4.   Strainer

Codes :

	a	b	c	d
A)	2	1	4	3
B)	1	4	3	2
C)	4	3	2	1
D)	3	2	1	4.

194. A Kaplan turbine is suitable for

A)   low head and low discharge   B)   low head and high discharge

C)   high head and low discharge   D)   high head and high discharge.

195. An axial flow turbine which is suitable for relatively low heads is

A)   Kaplan turbine   B)   Francis turbine

C)   Kaplan and Francis turbines   D)   None of these.

196. The equation of continuity of flow is based on the principle of conservation of

A)   flow   B)   mass

C)   momentum   D)   energy.

197. Momentum of the moving water destroyed produces a noise called knocking and a sudden rise in pressure is known as hammer blow.

All these happen in a

A) Draft tube   B) Surge tank

C) Pen stock   D) Runner.

198. Identify the false statement :

A) Specific heat of water $C_{p(w)}$ = 4·19 kJ/kg-K

B) Specific heat of ice $C_{p(ice)}$ = 2·1 kJ/kg K

C) Latent heat of ice = 336 kJ/kg

D) One ton of refrigeration = 333·33 kJ/min.

199. If the annual requirement of a company for a particular product is 500 and they make the orders once in three months, the EOQ will be equal to

A) 100   B) 125

C) 150   D) 175.

200. Match the folowing of the industrial activities of four categories of Henry Fayol :

List-I		List-II	
a)	Technical	1.	Buying, selling, exchange
b)	Commercial	2.	Protection of property and persons
c)	Financial	3.	Production, manufacture
d)	Security	4.	Search for the optimum use of capital

Now select the correct match from the codes given below :

	a	b	c	d
A)	3	4	3	1
B)	1	1	2	3
C)	4	3	1	2
D)	2	2	4	4.

Note : Representations if any shall be sent so as to reach the Commission's Office within 7 days. Representations Received after 23rd June 2012 will receive no attention.