प्रवक्ता (तकनीकी शिक्षा विभाग) प्रतियोगी परीक्षा, 2020

परीक्षा दिनांक :– 13-3-2021 समय :– 9.00AM-12.00 Noon

पुस्तिका में पृष्ठों की संख्या : 24
Number of Pages in Booklet : 24

पुस्तिका में प्रश्नों की संख्या : 150
No. of Questions in Booklet : 150

Paper Code : 01
Sub: Mechanical Engg.

समय : 3.00 घण्टे
Time : 3.00 Hours

LTE-12

Paper - I

Question Paper Booklet No. 7400897

25/3/21

अधिकतम अंक : 75
Maximum Marks : 75

प्रश्न-पत्र पुस्तिका एवं उत्तर पत्रक के पेपर सील/पॉलिथीन बैग को खोलने पर परीक्षार्थी यह सुनिश्चित कर लें कि उसके प्रश्न-पत्र पुस्तिका पर वही प्रश्न-पत्र पुस्तिका संख्या अंकित है जो उत्तर पत्रक पर अंकित है । इसमें कोई भिन्नता हो तो परीक्षार्थी वीक्षक से दूसरा प्रश्न-पत्र प्राप्त कर लें । ऐसा सुनिश्चित करने की जिम्मेदारी अभ्यर्थी की होगी ।

On opening the paper seal/polythene bag of the Question Paper Booklet the candidate should ensure that Question Paper Booklet No. of the Question Paper Booklet and Answer Sheet must be same. If there is any difference, candidate must obtain another Question Paper Booklet from Invigilator. Candidate himself shall be responsible for ensuring this.

परीक्षार्थियों के लिए निर्देश

1. **सभी** प्रश्नों के उत्तर दीजिए ।
2. **सभी** प्रश्नों के अंक समान हैं ।
3. प्रत्येक प्रश्न का केवल **एक** ही उत्तर दीजिए ।
4. एक से अधिक उत्तर देने की दशा में प्रश्न के उत्तर को गलत माना जाएगा ।
5. प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं, जिन्हें क्रमशः 1, 2, 3, 4 अंकित किया गया है । अभ्यर्थी को सही उत्तर निर्दिष्ट करते हुए उनमें से केवल एक गोले अथवा बबल को उत्तर-पत्रक पर **नीले बॉल प्वाइंट पेन** से गहरा करना है ।
6. **OMR** उत्तर-पत्रक इस परीक्षा पुस्तिका के अन्दर रखा है । जब आपको परीक्षा पुस्तिका खोलने को कहा जाए, तो उत्तर-पत्रक निकाल कर ध्यान से केवल **नीले बॉल पॉइंट पेन** से विवरण भरें ।
7. **प्रत्येक गलत उत्तर के लिए प्रश्न अंक का 1/3 भाग काटा जायेगा ।** गलत उत्तर से तात्पर्य अशुद्ध उत्तर अथवा किसी भी प्रश्न के एक से अधिक उत्तर से है । किसी भी प्रश्न से संबंधित गोले या बबल को खाली छोड़ना गलत उत्तर नहीं माना जायेगा ।
8. मोबाइल फोन अथवा इलेक्ट्रोनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित है । यदि किसी अभ्यर्थी के पास ऐसी कोई वर्जित सामग्री मिलती है तो उसके विरुद्ध आयोग द्वारा नियमानुसार कार्यवाही की जायेगी ।
9. कृपया अपना रोल नम्बर ओ.एम.आर. पत्रक पर सावधानीपूर्वक सही भरें । गलत अथवा अपूर्ण रोल नम्बर भरने पर **5 अंक** कुल प्राप्तांकों में से काटे जा सकते हैं ।

चेतावनी : अगर कोई अभ्यर्थी नकल करते पकड़ा जाता है या उसके पास से कोई अनधिकृत सामग्री पाई जाती है, तो उस अभ्यर्थी के विरुद्ध पुलिस में प्राथमिकी दर्ज कराते हुए विविध नियमों-प्रावधानों के तहत कार्यवाही की जाएगी । साथ ही विभाग ऐसे अभ्यर्थी को भविष्य में होने वाली विभाग की समस्त परीक्षाओं से विवर्जित कर सकता है ।

INSTRUCTIONS FOR CANDIDATES

1. Answer **all** questions.
2. **All** questions carry equal marks.
3. Only **one** answer is to be given for each question.
4. If more than one answers are marked, it would be treated as wrong answer.
5. Each question has four alternative responses marked serially as **1, 2, 3, 4**. You have to darken only one circle or bubble indicating the correct answer on the Answer Sheet using **BLUE BALL POINT PEN**.
6. The **OMR** Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully with **blue ball point pen** only.
7. **1/3 part of the mark(s) of each question will be deducted for each wrong answer.** A wrong answer means an incorrect answer or more than one answers for any question. Leaving all the relevant circles or bubbles of any question blank will not be considered as wrong answer.
8. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any of such objectionable material with him/her will be strictly dealt as per rules.
9. Please correctly fill your Roll Number in O.M.R. Sheet. **5 Marks** can be deducted for filling wrong or incomplete Roll Number.

Warning : If a candidate is found copying or if any unauthorized material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would liable to be prosecuted. Department may also debar him/her permanently from all future examinations.

इस परीक्षा पुस्तिका को तब तक न खोलें जब तक कहा न जाए ।
Do not open this Test Booklet until you are asked to do so.

01-□

1. High speed steel (18-4-1) contains -

(1) 1% Chromium

(2) 18% Nickel

(3) 18% Tungsten

(4) 4% Vanadium

2. Which of the following renders corrosion resistance in the stainless steel ?

(1) Carbon

(2) Manganese

(3) Nickel

(4) Chromium

3. Cast iron possessing which one of the following metallographic structures is best suited for damping capacity in engineering applications ?

(1) Excess cementite

(2) Carbon in temper form

(3) Silicon carbide in flake structure

(4) Spheroidal form of graphite

4. Which of the following, is produced from blast furnace ?

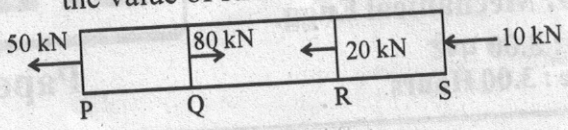
(1) Cast iron

(2) Wrought iron

(3) Mild Steel

(4) Pig iron

5. A bar, having 1000 mm^2 cross-sectional area, is subjected to axial loads as shown in the figure. What is the value of stress in QR section ?



(1) 30 MPa Compressive

(2) 30 MPa Tensile

(3) 50 MPa Compressive

(4) 50 MPa Tensile

6. The Poisson ratio of a material which has Young's modulus of 120 GPa and shear modulus of 50 GPa, is

(1) 0.1

(2) 0.2

(3) 0.3

(4) 0.4

7. The deformation of a bar under its own weight as compared to that when subjected to a direct axial load equal to its own weight will be

(1) half

(2) double

(3) one fourth

(4) the same

8. Materials which show direction dependent properties are called

(1) Anisotropic

(2) Isotropic

(3) Viscoelastic

(4) Homogeneous

9. A steel rod, with all its surfaces free to deform, has young's modulus 'E', Poisson's ratio 'ν', coefficient of thermal expansion 'α'. If the rod is uniformally heated with 'ΔT' temperature rise, what is the pressure developed ?

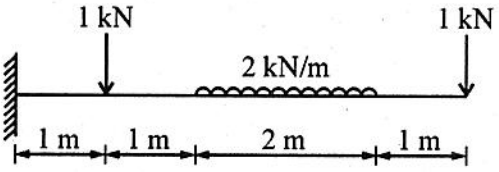
(1) $-\alpha\Delta TE / (1 - 2\nu)$

(2) $\alpha\Delta TE/(1 - 2\nu)$

(3) $E\alpha\Delta T/3(1 - 2\nu)$

(4) 0

10. For a cantilever, loaded as shown in figure, maximum shear force and maximum bending moments are –



(1) 4 kN, 14 kN-m sagging

(2) 4 kN, 14 kN-m hogging

(3) 6 kN, 18 kN-m sagging

(4) 6 kN, 18 kN-m hogging

11. Thermal Strain, developed in a rod of length 'l' and temperature rise 'ΔT', is given by –

(Where α = Coefficient of Thermal Expansion; E = Young's modulus)

(1) $\alpha\Delta T$

(2) $E\alpha\Delta Tl$

(3) $E\alpha\Delta T$

(4) Zero

12. In case of a beam of circular cross-section subjected to transverse loading, the maximum shear stress developed in the beam is greater than the average shear stress by

(1) 10%

(2) 25%

(3) 50%

(4) 33%

13. A twisting moment 'T' and Bending moment 'M' are acting on a circular shaft. What is the ratio of maximum shear stress to maximum bending stress ?

(1) 2M/T

(2) 2T/M

(3) T/M

(4) T/2M

14. The most economical cross section for a component subjected to bending is

(1) I section

(2) square

(3) circular

(4) channel section

15. If a beam is subjected to a constant bending moment along its length then the shear force will

(1) be maximum at the centre and zero at the ends

(2) zero at the centre and maximum at the ends

(3) be zero at all sections along the beam

(4) has a constant value everywhere along its length

16. At a Principal plane

(1) Shear stress is zero

(2) all stresses are zero

(3) Normal stress is zero

(4) Shear stress is maximum

17. A circular shaft subjected to twisting moment results in maximum shear stress of 90 MPa. Then the maximum compressive stress in the material is

(1) 130 MPa

(2) 100 MPa

(3) 80 MPa

(4) 90 MPa

18. A solid circular shaft, under pure torsion, develops maximum shear stress of 10 MPa on the surface. If the shaft diameter is halved, what will be the maximum shear stress developed corresponding to the same torque ?

(1) 05 MPa

(2) 40 MPa

(3) 20 MPa

(4) 80 MPa

19. While transmitting the same power by a shaft, if its speed is reduced by half, what should be its new diameter if the maximum shear stress induced in the shaft remains same ?

(1) $(2)^{½}$ of the original diameter

(2) $(1/2)^{½}$ of the original diameter

(3) twice of the original diameter

(4) $(2)^{1/3}$ of the original diameter

20. A simply supported laterally loaded beam was found to deflect more than a specified value. Which of the following measures will reduce deflections ?

(1) Increase the span of the beam

(2) Increase the area moment of inertia

(3) Magnitude of the load to be increased

(4) Select a different material having lesser modulus of elasticity

21. The equivalent length of a column having both ends fixed, is given by

(1) $l/\sqrt{2}$

(2) $l/2$

(3) $2l$

(4) l

22. Vertical columns of same material, height and weight have the same end conditions. Which cross-section will carry the maximum load ?

(1) Solid circular section

(2) Thin hollow circular section

(3) I - section

(4) Solid square section

23. A compression spring is made of music wire of 20 mm diameter having a shear strength and shear modulus of 600 MPa and 50 GPa respectively. The mean coil diameter is 20 mm, free length is 40 mm and number of active coils is 10. If the mean coil diameter is reduced to 10 mm, the stiffness of the spring is approximately

(1) Decreased by 2 times

(2) Increased by 2 times

(3) Decreased by 8 times

(4) Increased by 8 times

24. The number of independent elastic constants required to express the stress-strain relationship for a linearly elastic isotropic material is

(1) one

(2) two

(3) three

(4) four

25. Which of the following is the inversion of double slides crank chain ?

(1) Beam Engine

(2) Elliptical Trammel

(3) Watt's indicator mechanism

(4) Quick return mechanism

26. The value of Rankine's constant for mild steel is

(1) $\frac{1}{9000}$

(2) $\frac{1}{7500}$

(3) $\frac{1}{1600}$

(4) $\frac{1}{750}$

27. A Hooke's joint connects two

(1) Parallel shafts

(2) Non-parallel shafts

(3) Non-parallel & intersecting shafts

(4) Non-parallel non-intersecting shafts

28. The Davis steering gear fulfills the condition of correct gearing at

(1) two positions

(2) three positions

(3) all positions

(4) one position

29. Which of the following statement is incorrect ?

(1) Grashof's rule states that for a planar crank-rocker four bar mechanism, the sum of the shortest and longest link lengths cannot be less than the sum of the remaining two link lengths

(2) Inversions of a mechanism are created by fixing different links one at a time

(3) Geneva mechanism is an intermittent motion device

(4) Gruebler's criterion assumes mobility of a planar mechanism to be one.

30. Large military field guns which come to initial position after firing in shortest possible time are

(1) Critically damped

(2) Under damped

(3) Over damped

(4) Undamped

31. At pitch point in a cam the pressure angle is

(1) Maximum

(2) Minimum

(3) Zero

(4) 90°

32. In a band and block brake, the ratio of tensions on the tight and slack sides of band is given by (where μ = Coefficient of friction between the blocks and the drum, θ = Semi-angle of each block subtending at the centre of drum, and n = Number of blocks)

(1) $T_1/T_2 = \mu\theta \times n$

(2) $T_1/T_2 = (\mu\theta)^n$

(3) $T_1/T_2 = [(1 - \mu \tan \theta) / (1 + \mu \tan \theta)]^n$

(4) $T_1/T_2 = [(1 + \mu \tan \theta) / (1 - \mu \tan \theta)]^n$

33. When the speed of the engine fluctuates continuously above and below the mean speed then the governor is said to be :

(1) Hunting

(2) Stable

(3) Unstable

(4) Isochronous

34. A governor which can not be isochronous

(1) Watt

(2) Porter

(3) Hartnell

(4) Hartung

35. Commonly used tooth profile in gears used for power transmission is

(1) a cycloid

(2) an involute

(3) an ellipse

(4) a parabola

36. The size of cam depends on

(1) Base circle

(2) Prime circle

(3) Pitch circle

(4) Pitch curve

37. If the annular wheel of an epicyclic gear train has 200 teeth and the planet wheel has 40 teeth, the number of teeth on the sun wheel is

(1) 160

(2) 120

(3) 80

(4) 40

38. The gears employed for connecting two non-intersecting and non parallel i.e. non-coplanar shafts are

(1) Bevel gears

(2) Spiral gears

(3) Mitre gears

(4) Helical gears

39. In which machine a flyweel is generally employed ?

(1) Lathe

(2) Electric motor

(3) Punching machine

(4) Gear box

40. A reverted gear train is one in which the output shaft and input shaft

(1) are at right angles to each other

(2) rotate in opposite directions

(3) are coaxial

(4) are at an acute angle to each other

41. A 2 kg. block is resting on a rough surface with 0.1 coefficient of friction. A force of 1N is applied to the block as shown in figure. The friction force is -

(1) zero

(2) 1 N

(3) 1.96 N

(4) 1.20 N

42. Which of the bearings given below should not be subjected to a thrust load ?

(1) Deep groove ball bearing

(2) Angular contact ball bearing

(3) Cylindrical (straight) roller bearing

(4) Single row tapered roller bearing

43. Which of the following is not a friction clutch ?

(1) Disc clutch

(2) Cone clutch

(3) Jaw clutch

(4) Centrifugal clutch

44. In free vibrations, acceleration vector leads the displacement vector by

(1) π

(2) $\pi/2$

(3) $\pi/6$

(4) $2\pi/3$

45. Which one of the following can completely balance several masses revolving in different planes on a shaft ?

(1) Two equal masses in any two planes

(2) Two masses in any two planes

(3) A single mass in one of the planes of the revolving masses

(4) A single mass in any one plane

46. Which of the following in-line engines working on four-stroke cycle is completely balanced inherently ?

(1) 6 Cylinder engine

(2) 3 Cylinder engine

(3) 4 Cylinder engine

(4) 2 Cylinder engine

47. The maximum value of secondary unbalanced force as compared to the maximum value of primary, unbalanced force in reciprocating engines is -

(1) 1/n times

(2) n times

(3) 2n times

(4) n^2 times

48. In vibration isolation system, if $\omega/\omega_n = \sqrt{2}$ then transmissibility will be

(1) > 1

(2) $= 1$

(3) < 1

(4) zero

49. In a vibrating system the spring has stiffness 32 N/m and the mass 2 kg. The system is having a damper whose coefficient of viscous damping is 8 N-S/m. The system is :

(1) Over damped system

(2) Under damped system

(3) Critical damped system

(4) Undamped system

50. Allowable stress in ductile materials is given by

(1) Ultimate strength / factor of safety

(2) Fracture strength / factor of safety

(3) Yield strength / factor of safety

(4) Elastic limit / factor of safety

51. The gyroscopic effects due to rotating parts of an aircraft on a curved course depend on

(1) Flight altitude

(2) Flight velocity

(3) Radius of the curve

(4) Both (2) & (3)

52. A tension member of diameter d is designed with F.O.S. of 3. If the load and diameter are doubled F.O.S. will be

(1) Reduced to half

(2) Unchanged

(3) Tripled

(4) Doubled

53. A rod having cross-sectional area 100×10^{-6} m^2 is subjected to a tensile load. Based on the Tresca failure criterion, if the uniaxial yield stress of the material is 200 MPa, the failure load is :

(1) 10 kN

(2) 20 kN

(3) 100 kN

(4) 200 kN

54. For steels, the S-N curves is considered to become flat at

(1) 10^7 cycles

(2) 10^6 cycles

(3) 10^3 cycles

(4) Infinite cycles

55. When mild steel is subjected to tensile loading, the fracture will be of

(1) Star Shape

(2) Flat type

(3) Cup-and cone shape

(4) Granular shape

56. The ratio of Shear stresses of solid shaft (diameter 'd') to hollow shaft (internal diameter $\frac{'d'}{3}$, external diameter 'd') When subjected to same twisting moment

(1) $\frac{81}{80}$

(2) $\frac{80}{81}$

(3) $\frac{26}{27}$

(4) $\frac{27}{26}$

57. Which statement(s) is/are true ?

I. A parabolic curve joining S_e on the ordinate to S_{ut} on the abscissa is called the Gerber line

II. A straight line joining S_e on the ordinate to S_{vt} on the abscissa is called the soderberg line

III. A straight line joining S_e on the ordinate to S_{ut} on the abscissa is called the Goodman line

IV. A straight line joining S_{yt} on the ordinate to S_{yt} on the abscissa is called the limit on first cycle of stress.

(1) Only I is correct

(2) I, II and III are correct

(3) I, III and IV are correct

(4) All four are correct.

58. A cold rolled steel shaft is designed on the basis of maximum shear stress theory. The Principal stresses induced at its critical section are 500 MPa and −50 MPa respectively. If the yield stress for the shaft material is 400 MPa, the factor of safety of the design is

(1) 3

(2) 4

(3) 6

(4) 2

59. A flange coupling is used

(1) for intersecting shafts

(2) for collinear shafts

(3) for small shaft rotating at slow speeds

(4) for parallel shafts

60. Maximum shear stress developed on the surface of a solid circular shaft under pure torsion is 320 MPa. If the shaft diameter is doubled, then what is the maximum shear stress developed corresponding to the same torque ?

(1) 60 MPa

(2) 120 MPa

(3) 40 MPa

(4) 20 MPa

61. A spring with 25 active coils cannot be accommodated within a given space. Hence 5 coils of the spring are cut. What is the stiffness of the new spring ?

(1) Same as the original spring

(2) 0.5 times the original spring

(3) 0.8 times the original spring

(4) 1.25 times the original spring

62. The longest leaf in Semi-elliptic leaf spring is known as

(1) chief leaf

(2) master leaf

(3) major leaf

(4) higher leaf

63. A closed coiled helical spring is subjected to an axial load. The stress which is not produced in the wire of the spring is _____.

(1) Torsional shear stress

(2) Compressive stress

(3) Direct shear stress

(4) Bending stress

64. A multi disc clutch has 'n_1' discs on the driving shaft and 'n_2' discs on the driven shaft. The number of contact surfaces will be

(1) $n_1 + n_2$

(2) $n_1 + n_2 + 1$

(3) $n_1 + n_2 - 1$

(4) $n_1 - n_2 + 1$

65. In block brakes, the ratio of shoe width and drum diameter is kept between

(1) 0.1 to 0.25

(2) 0.25 to 0.50

(3) 0.50 to 0.75

(4) 0.75 to 1.0

66. The heat generated in brake depends upon,
Where P = intensity of normal pressure (N/mm^2)
V = rubbing speed (m/min)

(1) PV

(2) P/V

(3) PV^2

(4) $\frac{1}{2}PV^2$

67. In case of single plate new clutches and brakes, the friction radius is equal to _____, where D and d are outer and inner diameters of friction lining respectively.

(1) $\frac{1}{3}\left(\frac{D^3 - d^3}{D^2 - d^2}\right)$

(2) $\frac{1}{2}\left(\frac{D^3 - d^3}{D^2 - d^2}\right)$

(3) $\frac{1}{4}\left(\frac{D^3 - d^3}{D^2 - d^2}\right)$

(4) $\frac{1}{4}(D + d)$

68. Match List-I with List-II and select the correct answer using the codes given below the lists :

List-I	List-II
A. Ball Bearing	1. Carrying both radial and thrust loads
B. Tapered roller Bearing	2. Self-aligning property
C. Spherical roller Bearing	3. Light Loads
D. Needle roller Bearing	4. Heavy loads with oscillatory motion

Codes :

	A	B	C	D
(1)	1	2	3	4
(2)	3	1	2	4
(3)	2	4	1	3
(4)	4	3	2	1

69. Bearing characteristic number is given by

(1) ZN/P

(2) $\frac{PN}{Z}$

(3) $\frac{ZN}{P^2}$

(4) $\frac{PN}{Z^2}$

70. A pair of Spur gears consists of a 20 teeth pinion meshing with a 120 teeth gear. The module is 4 mm, what will be the center distance ?

(1) 560 mm

(2) 140 mm

(3) 700 mm

(4) 280 mm

71. In metric system, the size of the gear tooth is specified by,

(1) circular pitch

(2) diametral pitch

(3) module

(4) pitch circle diameter

72. If the load on a ball bearing is halved, its life

(1) Remains unchanged

(2) Increases two times

(3) Increases four times

(4) Increases eight times

73. The ratio of hoop stress to longitudinal stress is _____ for a thin cylinder subjected to internal pressure.

(1) 2 : 1

(2) 3 : 2

(3) 1 : 1

(4) 1 : 2

74. A thick cylinder with internal diameter d and outside diameter 2d is subjected to internal pressure p. Then the maximum hoop stress developed in the cylinder is

(1) p

(2) (2/3) p

(3) (5/3) p

(4) 2 p

75. A thin cylinder of 'D' internal diameter, is subjected to an internal pressure of 'P'. If the permissible tensile stress is σ_t, the cylinder wall thickness should be

(1) $\frac{2\sigma_t}{PD}$

(2) $\frac{PD}{\sigma_t}$

(3) $\frac{PD}{4\sigma_t}$

(4) $\frac{PD}{2\sigma_t}$

76. Organic binder used in moulding sand is

(1) Dextrin

(2) Bentonite

(3) Kaolonite

(4) Ball clay

77. Permeability of green moulding sand indicates its

(1) Green strength

(2) Dry strength

(3) Gas evolution capability

(4) Moisture content

78. The casting process that does not require a core to produce a hollow casting is

(1) shell moulding

(2) permanent mould casting

(3) hot-chamber die casting

(4) true centrifugal casting

79. Draft allowance permits

(1) easy withdrawal of cores

(2) easy withdrawal of casting

(3) easy ventilation of gases

(4) easy withdrawal of pattern

80. Non-consumable electrode is employed in

(1) Normal arc welding

(2) Submersed arc welding

(3) MIG Welding

(4) TIG Welding

81. In resistance seam welding, the electrode is in the form of a

(1) cylinder

(2) flat plate

(3) coil of wire

(4) circular disc

82. Drop forging is used to make parts in

(1) open-impression dies that involves only upsetting operation

(2) closed-impression dies that involves only upsetting operation

(3) closed-impression dies that involves only drawing out operation

(4) open-impression dies that involves only drawing out operation

83. The commonly used flux in brazing process is

(1) NaCl

(2) Lead

(3) Slag

(4) Borax

84. In the rolling process, roll separating force can be decreased by

(1) reducing the roll diameter

(2) increasing the roll diameter

(3) providing back-up rolls

(4) increasing the friction between the rolls and the metal

85. Discontinuous Chips are produced during machining of

(1) mild steel

(2) cast iron

(3) high carbon steel

(4) silicon steel

86. The cutting speed for maximum profit rate should be chosen as

(1) Below the speed for minimum cost

(2) In between the speeds for minimum cost and maximum production rate

(3) Equal to the speed for minimum cost

(4) Higher than the speed for maximum production rate

87. A disadvantage of cold working of metals is

(1) maximum deformation that can be given is limited

(2) dimensional accuracy obtained is less

(3) surface finish obtained is poor

(4) None of these

88. The jig bush most commonly used in jigs is

(1) Liner bush

(2) Headless drill bush

(3) Headed drill bush

(4) Shaped drill bush

89. A diamond pin is used in conjunction with a round locator for radial location in a jig because

(1) Diamond is harder material and hence has long life

(2) Reduces jamming possibility if two round locators are used

(3) Diamond pin is less expensive to make

(4) None of these

90. In a single point turning operation with a cemented carbide and steel combination having a Taylor exponent of 0.25, if the cutting speed is halved, then the tool life will become

(1) half

(2) two times

(3) eight times

(4) sixteen times

91. Material used for lathe bed is

(1) Cast iron

(2) Cast steel

(3) Mild steel

(4) Wrought iron

92. Which of the following is an interference fit ?

(1) Push fit

(2) Running fit

(3) Sliding fit

(4) Shrink fit

93. A shaft having limits of size as $20^{+0.050}_{+0.035}$ and a hole with limits of size as $20^{+0.000}_{+0.025}$ will have

(1) Interference fit

(2) Clearance fit

(3) Transition fit

(4) Cannot be determined

94. To lock the lathe carriage and the lead screw for thread cutting operation, the mechanism used is

(1) Half nut

(2) Tail stock

(3) Fly cutter

(4) Full nut

95. In a CNC milling operation, the tool has to machine the circular arc from point (20, 20) to (10, 10) at sequence number 5 of the CNC part program. If the center of the arc is at (20, 10) and the machine has incremental mode of defining position coordinates, the correct tool path command is

(1) N 05 G90 G01 X–10 Y–10 R10

(2) N 05 G91 G03 X–10 Y–10 R10

(3) N 05 G90 G03 X–20 Y–20 R10

(4) N 05 G91 G02 X–20 Y–20 R10

96. While specifying the axes of CNC machine tool (as per the ISO standards), the spindle axis is considered as

(1) X-axis

(2) Y-axis

(3) Z-axis

(4) A-axis

97. Most popular NC programming language is

(1) AUTOMAP

(2) APT

(3) ADAPT

(4) COBOL

98. The following process is suitable for machining brittle materials such as glass :

(1) Electric Discharge Machining (EDM)

(2) Electrochemical Machining (ECM)

(3) Ultrasonic Machining (USM)

(4) Chemical Machining (CHM)

99. Limitation of the electro chemical machining (ECM) process is

(1) Use of corrosive media as electrolytes makes it difficult to handle

(2) Poor surface finish

(3) Poor accuracy of the work piece dimensions because of the large tool wear

(4) There will be thermal damage to the work piece

100. Maximum number of membership in a private limited company can be

(1) 02

(2) 50

(3) 25

(4) 100

101. Tool material used in Electrical Discharge machining is

(1) Tungsten Carbide

(2) Diamond

(3) Brass or Copper

(4) Stainless Steel

102. Which type of organization structure is used in textile industry ?

(1) line organization

(2) staff organization

(3) function organization

(4) line and staff organization

103. The following is also known as Military organization.

(1) Line organization

(2) Functional organization

(3) Line and staff organization

(4) None of above

104. The symbol used for storage in work study is

(1) $\Rightarrow$

(2) S

(3) $\square$

(4) ∇

105. What is the minimum number of members required to form a public limited company ?

(1) 10

(2) 2

(3) 5

(4) 7

106. Which one of the following is not a technique under Pre-determined Motion Time System (PMTS) ?

(1) Work factor

(2) Synthetic data

(3) Stop Watch Time Study

(4) Method Time Measurement

107. A SIMO chart should be used with

(1) Process chart

(2) Flow diagram

(3) Man-Machine operation chart

(4) Therbligs

108. What material handling equipment is used if high volume of material is to be moved from one fixed location to another ?

(1) Trucks

(2) Fork lift

(3) Conveyors

(4) Cranes

109. In a stop-watch time study, the observed time was 0.16 minute; the performance rating factor was 125 on the 100 normal (percentage scale). What is the standard time in minutes if 10% allowances are permitted ?

(1) 0.180

(2) 0.200

(3) 0.220

(4) 0.240

110. When should process modifications be considered during product life cycle ?

(1) Introduction

(2) Growth

(3) Maturity

(4) Decline

111. Scheduling

I. is a general time table of manufacturing

II. is the time phase of loading

III. is loading all the work in process on machines according to their capacity

Which of these statements are correct ?

(1) I, II and III

(2) I and II

(3) II and III

(4) I and III

112. A conveyor is preferred to fork lift and trucks when

(1) Materials have to be moved on an infrequent basis

(2) Loads are mixed in size and weight

(3) There is horizontal material flow pattern

(4) Route does not vary and continuous movements are required

113. The layout of aircraft manufacturing factory should be

(1) Process layout

(2) Group layout

(3) Fixed location layout

(4) Product layout

114. Which one of the following is correct ?

Production planning and control functions are extremely complex in :

(1) Job-production shop producing small number of pieces only once

(2) Job-production shop producing small number of pieces intermittently

(3) Batch production shop producing a batch only once

(4) Batch production shop producing a batch at irregular intervals

115. The characteristic life-cycle of a product consists of four periods. The rate of consumption increases rapidly at the beginning of the

(1) Incubation period

(2) Growth period

(3) Maturity period

(4) Decline period

116. A variable which has no physical meaning, but is used to obtain an initial basic feasible solution to the linear programming problem is referred to as :

(1) Basic variable

(2) Non-basic variable

(3) Artificial variable

(4) Basis

117. The supply at three sources is 80, 30 and 40 units respectively while the demand at the four destinations is 30, 20, 25 and 55 units. In solving this transportation problem

(1) a dummy source of capacity 20 units is needed with unit transportation cost one.

(2) a dummy destination of capacity 20 units is needed with unit transportation cost zero.

(3) a dummy source of capacity 20 units is needed with unit transportation cost zero.

(4) a dummy destination of capacity 20 units is needed with unit transportation cost one.

118. In Simplex method if in pivot column all the entries are negative or zero when choosing leaving variable then

(1) Solution is Degenerate

(2) Solution is infeasible

(3) Alternative optima

(4) Unbounded

119. What is the game value of the following payoff matrix ?

	X	Y	Z
P	–5	10	20
Q	5	–10	–10
R	5	–20	–20

(1) 5

(2) 2

(3) 8

(4) 0

120. One of the assumptions in the game theory is :

(1) All players act rationally and intelligently

(2) Winner alone acts rationally

(3) Loser acts intelligently

(4) Both the players believe in luck

121. In Northwest corner method the allocations are made

(1) Starting from the left hand side top corner

(2) Starting from the right hand side top corner

(3) Starting from the lowest cost cell

(4) Starting from the lowest requirement and satisfying first

122. In typing work, the quality parameter is the number of errors committed per page. Which of the following control chart is appropriate for this case ?

(1) $\bar{x}$ chart

(2) P chart

(3) C chart

(4) S chart

123. Consider a process by which coils are manufactured. Samples of size 5 are randomly selected from the process, and the resistance values (in ohms) of the coils are measured. The data values are given in the form of sum of sample mean x bar as 521 for 25 samples. For sample of size 5 factors $A_2 = 0.577$. Then trial control limits for the x bar charts are

(1) UCL = 20.24 and LCL = 15.12

(2) UCL = 18.34 and LCL = 14.67

(3) UCL = 22.848 and LCL = 18.832

(4) UCL = 20.24 and LCL = 18.832

124. Which of the following is not a control chart for variables ?

(1) $\bar{x}$ chart

(2) R chart

(3) S - chart

(4) C - chart

125. The demand for a commodity is 100 units per day. Every time an order is placed, a fixed cost of ₹ 400 is incurred. Holding cost is ₹ 0.08 per unit per day. If the lead time is 13 days, then the economic lot size and the reorder point are in units

(1) 800 and 130

(2) 840 and 100

(3) 890 and 300

(4) 1000 and 300

126. Which forecasting method gives decreasing weightages to the demands for all the past periods ?

(1) Weighted moving average

(2) Moving average

(3) Exponential Smoothening method

(4) Simple average method

127. In E.O.Q. model, if holding cost is halved and ordering cost is doubled, the optimal order quantity will

(1) remain same

(2) be doubled

(3) be halved

(4) be one fourth

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

(1) Scheduling of machines

(2) Amount of labour to be committed

(3) Rate at which production should happen

(4) Inventory to be carried forward

129. Materials requirements planning is driven by

(1) master production schedule

(2) total quality measurement

(3) overall production planning

(4) overall inventory planning

130. Fixed cost of an equipment is ₹ 6,000, if variable cost of an item it produces is ₹ 2 per item and sells it for ₹ 7 per item, what is the break-even point ?

(1) 1200 items

(2) 3000 items

(3) 7000 items

(4) 6500 items

131. The output of an aggregate plan is

(1) Bill of material

(2) Demand forecast

(3) Overtime

(4) Total cost

132. What is the total float of an activity for which

Earliest Start time ES = 5

Earliest Finish time EF = 15

Latest Start time LS = 35

Latest Finish time LF = 45

(1) 10

(2) 20

(3) 30

(4) 40

133. Gantt chart is useful in

(1) Scheduling

(2) Forecasting

(3) Routing

(4) Both (2) & (3)

134. Dummy activities are used in a network to

(1) facilitate computation of slacks

(2) satisfy precedence requirements

(3) determine project completion time

(4) avoid use of resources

135. If the fixed cost of the assets for a given period tripled, then how much will the break-even quantity becomes.

(1) Half the original value

(2) Same as the original value

(3) Thrice the original value

(4) Twice the original value

136. The co-ordination number of FCC crystal is

(1) 8

(2) 16

(3) 10

(4) 12

137. Match List-I (Material) with List-II (Structure) and select the correct answer using the codes given below the lists :

	List-I	List-II
A.	Charcoal	1. FCC
B.	Graphite	2. HCP
C.	Chromium	3. Amorphous
D.	Copper	4. BCC

Codes :

	A	B	C	D
(1)	2	3	1	4
(2)	3	2	1	4
(3)	3	2	4	1
(4)	2	3	4	1

138. How many space lattices does Bravais Lattice consist of

(1) 3

(2) 7

(3) 14

(4) 15

139. Screw dislocation in a material is a _____ defect.

(1) Line

(2) Point

(3) Plane

(4) Volumetric

140. Which one of the following is correct for Burger's vector in screw dislocation ?

(1) Perpendicular to the dislocation line

(2) Inclined to the dislocation line

(3) Parallel to the dislocation line

(4) Opposite to the dislocation line

141. Work hardening in ductile material increases its

(1) Ductility

(2) Plasticity

(3) Electrical Conductivity

(4) Strength

142. If (3 2 6) are the Miller indices of a plane, the intercepts made by the plane on the three crystallographic axes are

(1) (a, b, c)

(2) (2a, 3b, c)

(3) (a, 2b, 3c)

(4) (2a, b, 3c)

143. What type of fracture occurs when crack propagation is along grain boundaries ?

(1) Intergranular fracture

(2) Transgranular fracture

(3) Cup and cone fracture

(4) Granular helicoidal

144. Which portion of the creep curve provides the information on steady state creep rate ?

(1) Primary stage

(2) Secondary stage

(3) Tertiary stage

(4) All the above

145. In normalising operation of a steel casting, the cooling is done in

(1) Oil bath

(2) Water

(3) air

(4) furnace

146. Which of the following is given by S-N curve for carbon steels ?

(1) Ultimate Strength

(2) Yield Strength

(3) Toughness

(4) Fatigue limit

147. If T_m is absolute melting temperature, then the recrystallization temperature for pure metals in terms of T_m is normally

(1) 0.7-0.8 T_m

(2) 0.8-0.9 T_m

(3) 0.6-0.7 T_m

(4) 0.3-0.4 T_m

148. Case hardening of low and medium carbon steel is done by

(1) Spheroidising

(2) Cyaniding

(3) Normalising

(4) Tempering

149. Which of the followings iron is the purest one ?

(1) Pig iron

(2) Mild Steel

(3) Wrought iron

(4) Cast iron

150. Which of the following case hardening processes, result in a change in the composition in a steel component ?

1. Carburizing
2. Cyaniding
3. Nitriding
4. Flame hardening

(1) 2, 3 and 4 only

(2) 1, 3 and 4 only

(3) 1, 2 and 3 only

(4) 1, 2, 3 and 4

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