

**MECHANICAL ENGINEERING
(OBJECTIVE TYPE)
PAPER – II**

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES **A, B, C** OR **D** AS THE CASE MAY BE IN THE APPROPRIATE PLACE IN THE ANSWER SHEET.
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. **DO NOT** write *anything else* on the Test Booklet
4. This Test Booklet contains 120 items (questions), 60 in PART – A and 60 in PART – B. Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark all your responses **ONLY** on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator **only the Answer Sheet**. You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.

10. Penalty for wrong answers:

THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.

- (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third (0.33)** of the marks assigned to that question will be deducted as penalty.
- (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
- (iii) If a question is left blank, i.e. no answer is given by the candidate, there will be **no penalty** for that question.

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01. In a flat belt drive the maximum tension which the belt can be subjected to is T and the mass of the belt per unit length is m kg. The velocity of the belt for maximum power transmission is

- (a) $\sqrt{\frac{T}{3m}}$ (b) $\sqrt{\frac{T}{m}}$ (c) $\frac{T}{3m}$ (d) $\frac{T}{m}$

Ans: (a)

02. Creep of belt can be controlled by

- (a) Decreasing belt length (b) Reducing stress in belt
(c) Increasing centre distance (d) Reducing belt velocity

Ans: (b)

03. The differential screw is used in a

- (a) Turnbuckle (b) Micrometer (c) Vernier caliper (d) Coupler

Ans: (a)

04. Multistart threads are used to get

- (a) Smaller linear displacement
(b) Larger linear displacement with assured self locking
(c) Larger linear displacement with no guarantee of self locking
(d) None of the above

Ans: (c)

05. Consider the following statements:

In an epicyclic gear train with 96 and 36 number of teeth on the annulus and sun respectively

1. Planet must have 30 teeth
2. There must be or 4 planets around the circumference.
3. Planets can never be input or output links.
4. Planets of the sun should be more than the rest

Which of these statements are correct?

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

Ans: (c)

06. Stub tooth is

- (a) Provided on the rack only (b) A tooth of standard profile
(c) Larger than standard tooth (d) Shorter than standard tooth

Ans: (d)

07. The boring bar of a boring machine is 25 mm in diameter. During operation, the bar gets twisted though 0.01 radians and is subjected to a shear stress of 42 N/mm². The length of the bar is (Taking $G = 0.84 \times 10^5$ N/mm²)

- (a) 500mm (b) 250mm (c) 625mm (d) 375 mm

Ans: (b)

08. Which of the following screw threads is adopted for power transmission in either direction?
- (a) Acme threads (b) Square threads
(c) Buttress threads (d) Multiple threads

Ans: (b)

09. In hydrodynamic bearings
- (a) The oil film is maintained by supplying oil under pressure
(b) The oil film pressure is generated only by the rotation of journal
(c) External supply of lubricant is not required
(d) Grease is used for lubrication

Ans: (b)

10. The piston pin bearings in heavy duty diesel engines are
- (a) Needle roller bearings (b) Tapped roller bearings
(c) Spherical roller bearings (d) Cylindrical roller bearings

Ans: (a)

11. The magnitude of stress induced in a shaft due to applied torque varies
- (a) From maximum at the centre to zero at the circumference
(b) From zero at the centre to maximum at the circumference
(c) From maximum at the centre to minimum but not zero at the circumference
(d) From minimum but not zero at the centre, to maximum at the circumference

Ans: (b)

12. An elastic material of Young's modulus E and Poisson's ratio ν is subjected to a compressive stress of σ_1 in the longitudinal direction. Suitable lateral compressive stress σ_2 are also applied along the other two each of the lateral directions to half of the magnitude that would be under σ_1 acting alone. The magnitude of σ_2 is
- (a) $\frac{\nu}{2(1+\nu)}\sigma_1$ (b) $\frac{\nu}{2(1-\nu)}\sigma_1$ (c) $\frac{\nu}{(1+\nu)}\sigma_1$ (d) $\frac{\nu}{(1-\nu)}\sigma_1$

Ans: (b)

13. A piece of material is subjected, to two perpendicular tensile stresses of 70 MPa and 10MPa. The magnitude of the resultant stress on a plane in which the maximum shear stress occurs is
- (a) 70 MPa (b) 60MPa (c) 50MPa (d) 10MPa

Ans: (c)

14. Which of the following hardness tests uses the principle of measurement of depth of indentation for obtaining the hardness value of the material being tested?
- (a) Brinell (b) Rockwell (c) Vickers (d) Barcol

Ans: (a)

15. A copper rod 400mm long is pulled in tension to a length of 401.2 mm by applying a tensile load of 330 MPa. If the deformation is entirely elastic, the Young's modulus of copper is
 (a) 110GPa (b) 110MPa (c) 11GPa (d) 11MPa

Ans: (a)

16. A rod of length l tapers uniformly from a diameter D at one end to a diameter d at the other. The Young's modulus of the material is E . The extension caused by an axial load P is
 (a) $\frac{4Pl}{\pi(D^2 - d^2)E}$ (b) $\frac{4Pl}{\pi(D^2 + d^2)E}$ (c) $\frac{4Pl}{\pi DdE}$ (d) $\frac{2Pl}{\pi DdE}$

Ans: (c)

17. A bar of copper and steel form a composite system which is heated through a temperature of 40°C . The stress induced in the copper bar is
 (a) Tensile (b) Compressive
 (c) Both tensile and compressive (d) Shear

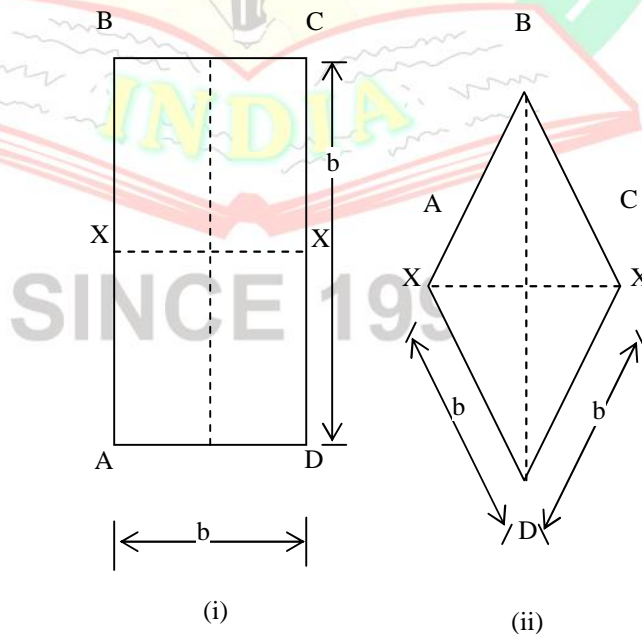
Ans: (b)

18. The buckling load for a column hinged at both ends is 10kN. If the ends are fixed, the buckling load changes to
 (a) 40kN (b) 2.5kN (c) 5kN (d) 20kN

Ans: (a)

19. The ratio of the moments of resistance of a square beam (Z) when square section is placed (i) with two sides horizontal (Z_1) and (ii) with a diagonal horizontal (Z_2) as shown is

- (a) $\frac{Z_1}{Z_2} = 1.0$
 (b) $\frac{Z_1}{Z_2} = 2.0$
 (c) $\frac{Z_1}{Z_2} = \sqrt{2}$
 (d) $\frac{Z_1}{Z_2} = 1.5$



Ans: (c)

20. A beam with a rectangular section of 120 mm × 60 mm, designed to be placed vertically is placed horizontally by mistake. If the maximum stress is to be limited, the reduction in load carrying capacity would be

- (a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{6}$

Ans: (a)

21. Match List I with List II and select the correct answer using the code given below the lists:

List I

- A. Car dashboard
B. Aircraft pipes
C. Conduct pipes
D. Bearings and gears

List II

1. Poly vinyl chloride (PVC)
2. TEFLON
3. Polyacrylonitrile
4. Polymethyl-methacrylate

Code:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 4 | 2 | 1 |
| (b) | 2 | 4 | 1 | 3 |
| (c) | 3 | 1 | 4 | 2 |
| (d) | 2 | 1 | 4 | 3 |

Ans: (a)

22. Which of the following belong to thermoplastics?

1. Natural resins
2. Phenol formaldehyde
3. Polystyrene
4. Poly vinyl chloride

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

All options wrong. Only '4' is correct.

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

- (a) Carburizing (b) Cyaniding
(c) Nitriding (d) Flame hardening

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

Ans: (c)

24. When steel containing less than 0.85% carbon is cooled slowly below the lower critical point, it contains

- (a) Ferrite mainly (b) Pearlite mainly
(c) Ferrite and pearlite (d) Pearlite and cementite

Ans: (c)

25. Interstitial Free Steels are used for
 (a) Forming crank shafts (b) Making of car bodies
 (c) Making of tall buildings (d) Making of steel rails for high speed tractions

Ans: (b)

26. Spheroidal or nodular graphite iron is designed as SG 500/7. Here '500' and '7' stand for
 (a) Proof stress in N/mm^2 and elongation in %
 (b) Tensile strength in N/mm^2 and impact strength in N-m
 (c) Tensile strength in N/mm^2 and elongation in %
 (d) Tensile strength in $kg.mm^2$ and elongation in %

Ans: (c)

27. Match List I with List II and select the correct answer using the code given below the lists:

List I

- A. Nickel
 B. Chromium
 C. Tungsten
 D. Vanadium

List II

1. Increases tensile strength in medium carbon steels
 2. Imparts hot hardness to steel
 3. Imparts hardness with high strength
 4. Increases toughness of steel

Code:

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

Ans: (c)

28. Addition of which one of the following elements, shifts the lower critical temperature line in iron-iron carbide diagram towards the higher side?
 (a) Chromium (b) Nickel (c) Molybdenum (d) Aluminium

Ans: (c)

29. In queuing theory, the number of arrivals per unit time is estimated by
 (a) Binomial distribution (b) Poisson distribution
 (c) Normal distribution (d) Bath tub analogy

Ans: (b)

30. Line imperfection in a crystal is called
 (a) Miller defect (b) Frankel defect
 (c) Shottky defect (d) Edge dislocation

Ans: (d)

31. Consider the following regarding their crystal structure:

1. Alpha iron
2. Aluminum
3. Nickel
4. Zinc

Which of these belong to FCC structure?

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

Ans: (a)

32. Elastic limit of cast iron as compared to its ultimate breaking strength is

- (a) Half (b) Double
(c) Approximately (d) None of the above

Ans: (c)

33. A circular bar L m long and d m in diameter is subjected to tensile force of F kN. Then the strain energy, U will be (where, E is the modulus of elasticity in kN/m^2)

- (a) $\frac{4F^2 \cdot L}{\pi d^2 \cdot E}$ (b) $\frac{F^2 \cdot L}{\pi d^2 \cdot E}$ (c) $\frac{2F^2 \cdot L}{\pi d^2 \cdot E}$ (d) $\frac{3F^2 \cdot L}{\pi d^2 \cdot E}$

Ans: (c)

34. If diameter of a long column is reduced by 20%, the percentage reduction in Euler's buckling load for the same end condition is

- (a) 4 (b) 36 (c) 49 (d) 60

Ans: (d)

35. For the case of a slender column of length L and flexural rigidity EI built in at its base and free at the top, the Euler's critical buckling load is

- (a) $\frac{4\pi^2 EI}{L^2}$ (b) $\frac{2\pi^2 EI}{L^2}$ (c) $\frac{\pi^2 EI}{L^2}$ (d) $\frac{\pi^2 EI}{4L^2}$

Ans: (d)

36. A seamless pipe of diameter d m is to carry fluid under a pressure of p kN/cm^2 . The necessary thickness t of metal in cm, if the maximum stress is not to exceed σ kN/cm^2 , is

- (a) $t \geq \frac{pd}{2\sigma}$ cm (b) $t \geq \frac{100pd}{2\sigma}$ cm (c) $t \leq \frac{pd}{2\sigma}$ cm (d) $t \leq \frac{100pd}{2\sigma}$ cm

Ans: (d)

37. If both the mean coil diameter and wire diameter of a helical compression or tension spring be doubled, then the deflection of the spring close coiled under same applied load will

- (a) be doubled (b) be halved
(c) increase four times (d) get reduced to one – fourth

Ans: (a)

38. 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?
- (a) Same as the original spring (b) 1.25 times the original spring
(c) 0.8 times the original spring (d) 0.5 times the original spring

Ans: (b)

39. A solid shaft of diameter 100 mm, length 1000 mm is subjected to a twisting moment T . The maximum shear stress developed in the shaft is 60N/m^2 . A hole of 50 mm diameter is now drilled throughout the length of the shaft. To develop a maximum shear stress of 60N/mm^2 in the hollow shaft, the torque T must be reduced by

- (a) $\frac{T}{4}$ (b) $\frac{T}{5}$ (c) $\frac{T}{12}$ (d) $\frac{T}{16}$

Ans: (d)

40. If a solid circular shaft of steel 2 cm in diameter is subjected to a permissible shear stress 10 kN/cm^2 , then the value of the twisting moment (T_r) will be

- (a) $10\pi\text{ kN-cm}$ (b) $20\pi\text{ kN-cm}$ (c) $15\pi\text{ kN-cm}$ (d) $5\pi\text{ kN-cm}$

Ans: (d)

41. Which of the following statements is correct for forging?

- (a) Forgeability is property of forging tool, by which forging can be done easily
(b) Forgeability decreases with temperature upto lower critical temperature
(c) Certain mechanical properties of the material are influenced by forging
(d) Pure metals have good malleability, therefore, poor forging properties.

Ans: (c)

42. Assumptions adopted in the analysis of open die forging are

1. Forging of friction is constant between work piece and die
2. Coefficient of friction is constant between work piece and die
3. Stress in the vertical (Y-direction) is zero.

- (a) 1 and 2 only (b) 1 and 3 only (c) 2 and 3 only (d) 1, 2 and 3

Ans: (a)

43. Which of the following are correct for an indirect hot extrusion process?

1. Billet remains stationary
2. There is no friction force between billet and container walls
3. The force required on the punch is more in comparison to direct extrusion.
4. Extruded parts have to be provided a support

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

Ans: (a)

44. Extrusion process can effectively reduce the cost of product through

- (a) Material saving (b) Process time saving
(c) Saving in tooling cost (d) Saving in administrative cost

Ans: (b)

45. Which of the following processes is also known as high energy rate forming?
(a) High velocity forming (b) Explosive fabrication
(c) Electro hydraulic forming (d) Magnetic pulse forming

Ans: (b)

46. In electrolysis
(a) For making copper powder, copper plate is made cathode in electrolyte tank
(b) For making aluminum powder, aluminum plate is made anode
(c) High amperage produces powdery deposit of cathode metal on anode
(d) Atomization process is more suitable for low melting point metals

Ans: (a)

47. The process of making hollow castings of non circular shape and desired thickness by permanent mould without the use of cores is known as
(a) Die casting (b) Slush casting
(c) Pressed casting (d) Centrifugal casting

Ans: (b)

48. The ratio of surface area of volume for a unit volume of riser is minimum in case of
(a) Cylindrical riser (b) Spherical riser
(c) Hemispherical riser (d) Cuboids riser

Ans: (a)

49. Which of the following factors improve weld ability of steel?

1. Low carbon content
2. High carbon content
3. Good affinity content
4. Poor affinity to oxygen

- (a) 1 and 3 (b) 2 and 3 (c) 1 and 4 (d) 2 and 4

Ans: (c)

50. Brittle welds are mainly obtained due to
(a) Wrong electrode, faulty preheating and metal hardened by air
(b) Faulty welds, faulty sequence and rigid joints
(c) Wrong speed, current improperly adjusted and faulty preparation
(d) Uneven heat, improper sequence and deposited metal shrinks

Ans: (d)

51. The advantage o the welding process is
(a) It relieves the joint from residual stresses
(b) It helps in checking of distortion of work piece
(c) Large number of metals and alloys, both similar and/or dissimilar can be joined.
(d) Heat produced during the welding does not produce metallurgical changes.

Ans: (c)

52. Which of the following are associated with Heat Affected Zone?
1. Cold cracking
 2. Notch toughness
 3. Hydrogen embrittlement
 4. Stress corrosion cracking
- (a) 1, 2 and 3 only (b) 1, 3 and 4 only (c) 2, 3 and 4 only (d) 1, 2, 3 and 4

Ans: (c)

53. Lathe machine with turret can turn a work piece of limited length only because,
- (a) Cross slide motion is obstructed by turret (b) Turret cannot work on a long job
(c) Chuck cannot be replaced by a face plate (d) Turret replaces the loose centre

Ans: (a)

54. Rank order clustering as applied to manufacturing automation is
- (a) A technique of identifying process sequence in production of a component
(b) A just in time (JIT) method
(c) An approach of grouping the machines into cells in an FMS system
(d) A tool to generate bill of materials

Ans: (c)

55. The configuration of a robot using a telescoping arm that can be raised or lowered on a horizontal pivot mounted on a rotating base is called
- (a) Polar (b) Cylindrical
(c) Cartesian coordinate (d) Jointed arm

Ans: (a)

56. Programmable automation is suitable for
- (a) Low production volume and large varieties of parts
(b) Low production volume and small varieties of parts
(c) High production volume and small varieties of parts
(d) High production volume and large varieties of parts

Ans: (d)

57. The usual method of defining machinability of a material is by an index based on
- (a) Hardness of work material (b) Production rate of machined parts
(c) Surface finish of machined surfaces (d) Tool life

Ans: (a)

58. In Taylor's tool life equation $VT^n = C$, the constants n and C depend upon
1. Work piece material
 2. Tool material
 3. Coolant
- (a) 1, 2, and 3 (b) 1 and 2 only (c) 2 and 3 only (d) 1 and 3 only

Ans: (a)

59. Tool life increase with increase in
(a) Cutting speed (b) Nose radius (c) Feed (d) Depth of cut

Ans: (b)

60. The most important function of the cutting fluid is to
(a) Provide lubrication (b) Cool the tool and work piece
(c) Wash away the chips (d) Improve surface finish

Ans: (b)

61. By default a real number is treated as a
(a) Float (b) Double
(c) Long double (d) None of the above

Ans: (a)

62. Which bitwise operator is suitable for turning on a particular bit in a number?
(a) & & operator (b) & operator (c) operator (d) operator

Ans: (d)

63. If the two strings are identical, then strcmp () function returns
(a) -1 (b) 1 (c) 0 (d) Yes

Ans: (c)

64. The keyword used to transfer control from a function back to the calling function is
(a) switch (b) go to (c) goback (d) return

Ans: (d)

65. Which of the following cannot be checked in switch-case statement?
(a) Character (b) Integer (c) Float (d) Enum

Ans: (c)

66. The time required for the fetching and execution of one simple machine instruction is
(a) Delay time (b) CPU cycle (c) Real time (d) Seek time

Ans: (b)

67. What will the function rewind () do ?
(a) Reposition the file pointer to a character reverse
(b) Reposition the file pointer to beginning of file
(c) Reposition the file pointer to beginning of line
(d) Reposition the file pointer to beginning of file

Ans: (d)

68. In simplex method, the variables which have not been assigned the value zero during the iteration, are called
- (a) Basic variables (b) Actual variables
(c) Artificial variables (d) None of the above

Ans: (c)

69. In PERT, the distribution of activities times, is assumed to be
- (a) Normal (b) Gamma (c) Beta (d) Exponential

Ans: (c)

70. The type of schedule inherent in the material requirements planning (MRP) procedure is
- (a) Forward schedule
(b) Backward schedule
(c) Both backward and forward schedule
(d) Different from backward and forward schedule

Ans: (b)

71. In an economic order quantity based inventory control when re-order level is greater than order quantity, the number of orders outstanding at any time is
- (a) Never more than one (b) At least one
(c) No order outstanding (d) One only

Ans: (b)

72. ABC analysis is useful because it
1. Identifies vital few and trivial many
 2. Classifies items into three classes
- (a) Neither 1 nor 2 (b) Both 1 and 2
(c) 1 only (d) 2 only

Ans: (b)

73. In a quantity discount model of inventory control, the relevant costs are
- (a) Annual purchase cost
(b) Annual order cost and annual carrying cost
(c) Annual purchase cost, annual order cost and annual carrying cost
(d) Annual order cost

Ans: (c)

74. Which of the following is true with respect to a PERT network?
- (a) Activity duration is beta-distributed and project duration is normally distributed
(b) Activity duration is normally distributed and project duration is beta distributed
(c) Activity duration is deterministic and hence project duration is also deterministic
(d) Four time estimates are used for determining average duration of an activity

Ans: (a)

75. The shortest processing time prioritization rule is used for
- (a) Reducing a queue size in front of a single server
 - (b) Reducing work-in-process in a single server system
 - (c) Reducing average flow time of jobs waiting in front of a server
 - (d) All of the above

Ans: (d)

76. In an exponentially weighted moving average, the weight of the demand of past periods
- (a) Increases as age of the data increases
 - (b) Increases as age of the data decreases
 - (c) Decreases as age of the data increases
 - (d) Has no relationship with age of the data

Ans: (c)

77. Rolling horizon in forecast is used for
- (a) Allowing same length of forecast horizon by easily adding a new period when one period is over
 - (b) Easy updating of changes and maintaining same length of forecast horizon by adding a new period when one period is over
 - (c) Easy updating of changes and there is no addition of a new period
 - (d) Different reasons other than the above

Ans: (b)

78. Clearance in a fit is the difference between
- (a) Maximum hole size and minimum shaft size
 - (b) Minimum hole size and maximum shaft size
 - (c) Maximum hole size and maximum shaft size
 - (d) Minimum hole size and minimum shaft size

Ans: (b)

79. Which of the following processes has very high material removal rate efficiency?
- (a) Electron beam machining
 - (b) Electrochemical machining
 - (c) Electro discharge machining
 - (d) Plasma arc machining

Ans: (c)

80. During orthogonal cutting, an increase in cutting speed causes
- (a) An increase in longitudinal cutting force
 - (b) An increase in radial cutting force
 - (c) An increase in tangential cutting force
 - (d) Cutting forces to remain unaffected

Ans: (d)

81. What is the purpose of the flush () function?
- (a) Flushes all streams and specified streams
 - (b) Flushes only specified stream
 - (c) Flushes input/output buffer
 - (d) Flushes file buffer

Ans: (d)

Directions: Each of the next nineteen (19) items consists of two statements, one labeled as the 'Statement(I)' and the other as 'Statement (II)'. You are to examine these two statements carefully and select the answers to these items using the codes given below:

Codes:

- (a) Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)
- (b) Both Statement (I) and Statement (II) are individually true but Statement (II) is not the correct explanation of Statement (I)
- (c) Statement (I) is true but Statement (II) is false
- (d) Statement (I) is false but Statement (II) is true

82. Statement (I): Method of obtaining different mechanisms by fixing in turn different links in a kinematic chain is known as inversion.
Statement (II): Scotch Yoke mechanism is an inversion of a double slider crank mechanism.

Ans: (b)

83. Statement (I): Generally, for larger size pulleys. Curved arms are used
Statement (II): Curved arms are less liable to fracture from internal stresses set-up due to unequal rates of cooling of the hub and the rim.

Ans: (d)

84. Statement (I): Mohr's circle of stress can be related to Mohr's circle of strain by some constant of proportionality
Statement (II): The relationship is a function of yield strength of the material

Ans: (a)

85. Statement (I): Ductile materials generally absorb more impact energy than the brittle materials.
Statement (II): Ductile materials generally have higher ultimate strength than brittle materials.

Ans: (c)

86. Statement (I): Steel reinforcing bars are used in reinforced cement concrete.
Statement (II): Concrete is weak in compression.

Ans: (c)

87. Statement (I): If the bending moment along the length of a beam is constant, then the beam cross-section will not experience any shear stress.
Statement (II): The shear force acting on the beam will be zero everywhere along its length

Ans: (a)

88. Statement (I): It is difficult to maintain close tolerance in normal forging operation.
Statement (II): Forging is workable for simple shapes and has limitation for parts having undercuts.

Ans: (b)

89. Statement (I): Parts made by powder metallurgy do not have as good physical properties as parts casted.
Statement (II): Particle shape in powder metallurgy influences the flow characteristic of the powder.

Ans: (b)

90. Statement (I): Cupola furnace is not employed for melting steel in foundry
Statement (II): The temperatures generated within a cupola are not adequate for melting steel

Ans: (d)

91. Statement (I): In gas welding the metal to be joined gets oxidized or carburized
Statement (II): The neutral flame affects no chemical change on the molten metal.

Ans: (a)

92. Statement (I): DC with reverse polarity is used in MIG welding
Statement (II): Use of DC with reverse polarity enables deeper penetration and a clean surface

Ans: (a)

93. Statement (I): Hydrogen induced cracking occurs in the heat effected zone adjacent to fusion zone and classified as solid state cracking
Statement (II): Hydrogen from burning of flux coating penetrates martensitic micro cracks preventing healing as well as enlarging them.

Ans: (a)

94. Statement (I): Honing is an abrading process to remove stock from metallic surfaces.
Statement (II): Honing is commonly done on internal surfaces.

Ans: (d)

95. Statement (I): Vibrations in milling are induced due to interrupted cutting operation.
Statement (II): Vibrations can be suppressed to a large extent by using equal spacing of teeth along the periphery of the cutters.

Ans: (c)

96. Statement (I): Negative rake angles are preferred on rigid set-ups for interrupted cutting and difficult-to-machine materials.
Statement (II): Negative rake angle directs the chips on to the machined surface

Ans: (c)

97. Statement (I): In Electro Discharge Machining (EDM) process, tool is made cathode and work piece anode
Statement (II): In this process if both electrodes are made of same material, greatest erosion takes place upon anode

Ans: (a)

98. Statement (I): The knowledge about the nature of time series components is required for better forecasting
Statement (II): Moving average and simple exponential smoothing models are used for time series demand forecasting but they are suitable for average demand process.

Ans: (b)

99. Statement (I): A two-machine n-job sequencing problem with all jobs having same machine sequence is an example of sequencing problem in a flow shop.
Statement (II): All the flow shop problems can be optimally sequenced to minimize make span using Johnson's rule.

Ans: (a)

100. Statement (I): Low level code is used for record processing of items in the material requirement planning (MRP).
Statement (II): Low level code helps in transferring all the requirements from the parents of the item in a single record processing step.

Ans: (a)

101. The effect of increasing the stiffness springs of centrifugal clutch is
(a) The decrease of engagement speed
(b) The increase of engagement speed
(c) The increase of frictional force at maximum speed
(d) None of the above

Ans: (b)

102. A flat end foot step bearing supports a vertical shaft of 150 mm diameter rotating at 10rad/s. The shaft carries a vertical load of 20 kN. Assuming uniform pressure distribution and coefficient of friction equal to 0.05, the power lost in friction is
(a) 500W (b) 750W (c) 1000W (d) 1125W

Ans: (a)

103. A fit on a hole- shaft system is specified as H7-s6. The type of fit is
(a) Clearance fit (b) Running (sliding) fit
(c) Transition fit (d) Interference fit

Ans: (d)

104. Consider the following statements associated with variable loading of bolts:
1. Smaller the stiffness constant, larger will be the external load carried by the bolts
 2. Greater the pre-tension, lesser will be the value of the alternating load carried by the bolts.
 3. In variable loading, variable component is more dangerous than static component.
 4. A high value of pre-tension is undesirable against fatigue failure.
- Which of these statements are correct?
(a) 1, 2, 3 and 4 (b) 2 and 3 only (c) 2 and 4 only (d) 1 and 2 only

Ans: (b)

105. A cotter joint is capable of transmitting
(a) The twisting moment (b) An axial tensile as well as compressive load
(c) The bending moment (d) Only axial compressive

Ans: (b)

106. The critical speed of shaft depends on
(a) Mass only (b) Stiffness only
(c) Mass and Stiffness (d) Mass, Stiffness and Eccentricity

Ans: (c)

107. In case of free vibrations with viscous damping, the damping force is proportional to
(a) The displacement (b) The velocity
(c) The acceleration (d) The natural frequency

Ans: (b)

108. A free damped vibration system with viscous damping consists of a mass m , spring stiffness k and a damper with a damping coefficient which can be varied. The natural frequency of the system is ω_n . For the system to be critically damped, the damping coefficient C_c is

- (a) $2m \omega_n$ (b) $m\omega_n$ (c) $\sqrt{2} m\omega_n$ (d) $\frac{1}{\sqrt{2}} m\omega_n$

Ans: (a)

109. A three cylinder radial engine driven by a common crank of radius r has the cylinders spaced at 120° among each other. The mass of the reciprocating parts per cylinder is m kg. The primary unbalance force at a crank shaft speed of ω rad/s

- (a) $\frac{3}{2} m\omega^2 r$ (b) $3 m\omega^2 r$ (c) $\frac{1}{3} m\omega^2 r$ (d) $m\omega^2 r$

Ans: (a)

110. In order to have complete balance of several revolving masses mounted in different planes and different angular positions over a shaft

- (a) The resultant force must be zero
(b) The resultant couple must be zero
(c) The resultant force as well as couple must be zero
(d) Either the resultant force or the resultant couple must be zero

Ans: (c)

111. The function of the governor is

- (a) To limit the fluctuations of speed during each cycle
(b) To maintain the supply of fuel to the engine cycle constant when the load on the engine varies
(c) To maintain constant speed of rotation of the crank shaft when the load on the engine varies
(d) To maintain constant speed of rotation of the crank shaft when the load on the engine is constant

Ans: (c)

112. The primary function of the flywheel is

- (a) To limit the fluctuations of speed during each cycle
(b) To absorb energy during those periods of crank rotation when turning moment is less than the resisting moment
(c) To maintain constant speed of rotation of the crank shaft when the load on the engine increases.
(d) To maintain constant speed of rotation of the crank shaft when the load on the engine decreases

Ans: (a)

113. Consider the following statements in connection with involute profile characteristics:

1. Tangent to base circle is also tangent to profile.
2. Common tangent to two base circle passes through pitch point.
3. Pressure angle for involute profile is constant
4. Involute teeth gear correctly even when centre distance is varied slightly.

Which of these statements are correct?

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

Ans: (c)

114. Consider the following statements:

The transmission of motion from a pinion to a meshing gear of involute profile is a case of

1. Pure rolling
2. Sliding with constant velocity of sliding
3. Sliding with time varying velocity of sliding
4. Rolling with some amount of sliding

Which of these statements are correct?

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

Ans: (a)

115. In the case of involute system of gears, if the centre distance is changed

- (a) The velocity ratio changes (b) The pressure angle changes
(c) The pitch circle remain unaffected (d) The law of gearing fails to get satisfied

Ans: (b)

116. Consider the following profiles of mating gear teeth:

1. Involute profiles
2. Cycloidal profiles
3. Conjugate profiles

Which of these satisfy the law of gearing?

- (a) 1 and 2 only (b) 1 and 3 only (c) 2 and 3 only (d) 1, 2 and 3

Ans: (d)

117. The differential gear is fitted on rear axle of automobiles; its function is

- (a) To rotate the front wheels at different speeds
(b) To rotate the back wheels at the same speed during turning
(c) To rotate the back wheel at different speeds during turning
(d) To permit the two back wheels to rotate at the different speeds when driving in the straight path.

Ans: (c)

118. In an elliptic trammel, the length of the link connecting the two sliders is 100mm. The tracing pen is placed on 150mm extension of this link. The major and minor axes of the ellipse traced by the mechanism would be

- (a) 250 mm and 150 mm (b) 250 mm and 100 mm
(c) 500mm and 300 mm (d) 500 mm and 200 mm

Ans: (a)

119. In a crank and slotted lever quick return motion mechanism, the distance between the fixed centers is 160 mm and the driving crank is 80mm long. The ratio of time taken by cutting and return strokes is

- (a) 0.5 (b) 1 (c) 1.5 (d) 2

Ans: (d)

120. The driving and driven shafts connected by a Hooke's joint are inclined by an angle α to each other. The angle through which the driving shaft turns is given by θ . The condition for the two shafts to have equal speeds is

- (a) $\cos\theta = \sin\alpha$ (b) $\sin\theta = \pm\sqrt{\tan\alpha}$ (c) $\tan\theta = \pm\sqrt{\cos\alpha}$ (d) $\cot\theta = \cos\alpha$

Ans: (c)



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