

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

TEST BOOKLET
A.P.(Mech.) T.E.-2016


Time Allowed : 2 Hours]

[Maximum Marks : 100

All questions carry equal marks.

INSTRUCTIONS

1. Immediately after the commencement of the examination, you should check that 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. Write your Roll Number only in the box provided alongside.
Do not write anything else on the Test Booklet.
3. This Test Booklet contains **100** items (questions). Each item comprises four responses (answers). Choose only one response for each item, which you consider the best.
4. After the candidate has read each item in the Test Booklet and decided which of the given responses is correct or the best, he has to mark the circle containing the letter of the selected response by blackening it completely with Black or Blue ball pen. In the following example, response "C" is so marked :


5. Do the encoding carefully as given in the illustrations. While encoding your particulars or marking the answers on answer sheet, you should blacken the circle corresponding to the choice in full and no part of the circle should be left unfilled. After the response has been marked in the ANSWER SHEET, no erasing/fluid is allowed.
6. You have to mark all your responses ONLY on the ANSWER SHEET separately given according to 'INSTRUCTIONS FOR CANDIDATES' already supplied to you. Responses marked on the Test Booklet or in any paper other than the answer sheet shall not be examined.
7. All items carry equal marks. Attempt all items. Your total marks will depend only on the number of correct responses marked by you in the Answer Sheet. There will be no negative marking.
8. Before you proceed to mark responses in the Answer Sheet, fill in the particulars in the front portion of the Answer Sheet as per the instructions sent to you.
9. 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.
10. After you have completed the test, hand over the Answer Sheet only, to the Invigilator.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

A.P. (Mech.) T.E.-2016

Time Allowed : 2 Hours]

[Maximum Marks : 100

1. Condition for stating that the centre of gravity of a body is completely determined is when :
 - (A) the body has $(3 + 2)$ planes of symmetry
 - (B) the body has $(3 + 1)$ planes of symmetry
 - (C) the body has $(3 + 0)$ planes of symmetry
 - (D) the body has $(3 - 2)$ planes of symmetry

2. provides complete restraint against transverse or longitudinal motion and against rotation.
 - (A) A frictionless bearing
 - (B) An ideal clamped support
 - (C) A weightless flexible string
 - (D) A frictionless pin joint

3. theorem is used based on strain energy concept and can be used for determining deflection in a beam.
 - (A) Euler's
 - (B) Rankine's
 - (C) Gourdan's
 - (D) Castigliano's

4. As the axes of the rolling of the ship and of the rotor are, there is no precession of the axis of spin and thus there is no gyroscopic effect.
- (A) Perpendicular (B) Parallel
- (C) Inclined at any angle (D) Inclined at 45 degrees
5. If small disturbances do not create any additional forces and so the body remains in the disturbed position, is a case of :
- (A) stable equilibrium (B) unstable equilibrium
- (C) neutral equilibrium (D) none of these
6. Axial flow pumps can handle :
- (A) very large volumes at low pressure
- (B) very low volumes at high pressure
- (C) very low volumes at medium pressure
- (D) none of the above

7. In the heat flow problems, the temperature at any point within the system varies non-linearly with time.
- (A) periodic (B) non-periodic
- (C) non-transient counter (D) radiative counter
8. The hydraulic pump efficiency is defined as :
- (A) rotor specific energy/specific energy ideally available from fluid
- (B) useful specific energy transferred to the fluid/rotor specific energy
- (C) useful specific energy transferred to the fluid/specific energy ideally available from fluid
- (D) rotor specific energy/useful specific energy transferred to the fluid
9. In a heat exchanger, a pure fluid X condenses from a saturated vapor to saturated liquid, while exchanging heat with a fluid Y. The temperature of fluid X in the direction of flow.
- (A) stays constant (B) increases
- (C) decreases (D) none of these

10. In Oxy-hydrogen welding the flame temperature is around :
- (A) 874°C (B) 1074°C
(C) 2870°C (D) 4852°C
11. force is present inside the mould cavity because of the head with which the metal is entering the mould cavity during sand casting.
- (A) Metallostatic (B) Centripetal
(C) Coriolis (D) Shear
12. In rolling of metal, one of the principal breakdown pass sequence is :
- (A) Trapezoidal series (B) Diamond - square series
(C) Blasting series (D) Geometric series
13. Merchant Circle Diagram is used for analysis during metal cutting.
- (A) temperature (B) feed rate
(C) heat transfer (D) force

14. If the diameter of shaft is doubled its stiffness increases by a factor of :
- (A) 2 (B) 6
(C) 16 (D) 24
15. In case of relative equilibrium of a particle with respect to a moving body, the algebraic sum of the projections, on any axis, of all real forces acting on the particle together with the due to base acceleration must be zero.
- (A) Frictional force (B) Inertia force
(C) Tangential force (D) Shear force
16. In the case of analysis of fracture of brittle specimens and structures when all three principal stresses are compressive, theory seems to predict lower strengths than are actually obtained.
- (A) Mcaulay's (B) Von-Tresca's
(C) Griffith's (D) Albert's

17. velocity of the follower implies that the displacement of the follower is proportional to the cam displacement and the slope of the displacement curve is constant.

- (A) Constant (B) Uniformly increasing
(C) Uniformly decreasing (D) Non-uniform

18. A governor with a range of speed is known as an Isochronous governor.

- (A) 1000 (B) infinity
(C) unity (D) zero

19. A jet of water initially 12 cm diameter when directed vertically upwards, reaches a maximum height of 20 meters. Assuming the jet remains circular, the flow rate will be :

- (A) $0.224 \text{ m}^3/\text{sec}$ (B) $0.112 \text{ m}^3/\text{sec}$
(C) $0.056 \text{ m}^3/\text{sec}$ (D) $0.448 \text{ m}^3/\text{sec}$

20. In a two-way spool valve used in hydraulic systems, the moving member is called :
- (A) land (B) groove
(C) spool (D) shuttle
21. The "characteristic length" for horizontal plates while dealing with natural convection problems is given by :
- (A) surface area of the plate/perimeter of the plate
(B) perimeter of the plate/surface area of the plate
(C) surface area of the plate/volume of the plate
(D) volume of the plate/surface area of the plate
22. During the liquefaction of gases, if the gas is at a sufficiently low temperature and high pressure, the throttling process would bring the gas into the saturated-mixture region, where the vapour and liquid could be separated using :
- (A) Linde liquefier (B) Hamstead liquefier
(C) Thomson liquefier (D) Slinger liquefier

23. "All reversible heat engines operating between the same temperature have the same efficiency." This is :

(A) Rankine's theorem 2

(B) Carnot's theorem 2

(C) Brayton's theorem

(D) Sterling's theorem

24. While welding of Nickel using GMAW process, the shielding gas commonly used is :

(A) Oxygen + carbon dioxide

(B) Carbon dioxide

(C) Oxygen

(D) Argon

25. are metallic supports often kept inside the mould cavity to support the cores.

(A) Chaplets

(B) Chill

(C) Sprue

(D) Step riser

26. The internal ruptures caused due to improper cooling of the large forging is known as :
- (A) Flakes (B) Stacks
(C) Burn outs (D) Cold shut
27. In a articulated joint robot the number of degrees of freedom associated with arm and body motion will be :
- (A) 1 (B) 2
(C) 3 (D) 4
28. Maximum value of frictional force acting on a body, when the body is just about to start is called :
- (A) limiting friction (B) static friction
(C) dynamic friction (D) none of these
29. In the case of an unstable position of equilibrium of the body, its potential energy on any virtual displacement.
- (A) decreases (B) increases
(C) is always zero (D) remains constant

30. The case of axial sudden load 'P' applied on a bar of uniform cross-section, the stress induced will be the stress induced due to gradually applied load 'P' on the same bar.

(A) same

(B) twice

(C) thrice

(D) half

31. When the two surfaces in contact have a minute thin layer of lubricant between them, it is known as friction.

(A) film

(B) skin or greasy

(C) dry

(D) solid

32. systems are used to determine the moment of inertia of irregular bodies.

(A) Multifilar

(B) Unifilar

(C) Multistar

(D) Tristar

33. Mach number for a moving source at sonic speed will be :
- (A) zero (B) greater than 1
(C) less than 1 (D) equal to 1
34. In pipe flow, the momentum correction factor is :
- (A) Kinetic energy based on actual velocity/momentum based on average velocity
(B) Kinetic energy based on actual velocity/Kinetic energy based on average velocity
(C) Momentum based on average velocity/Kinetic energy based on actual velocity
(D) Momentum based on actual velocity/Momentum based on average velocity
35. Hottel's crossed String method is used for determining which are infinite in one direction.
- (A) surface factor (B) line factor
(C) shape factor (D) volume factor

36. The total volume of a mixture of gases is equal to the sum of the volumes that would be occupied by each component at the mixture temperature T and pressure P applicable to ideal gases is :
- (A) Dalton's law (B) Avogadro's law
(C) Amagat's law (D) Kelvin's law
37. The area under T-S diagram always represents the heat transferred is *true* for :
- (A) irreversible processes only
(B) reversible processes only
(C) for both reversible and irreversible for processes
(D) none of the processes
38. In atomic hydrogen welding, the arc is struck between the :
- (A) tungsten electrode and work piece
(B) copper electrode and work piece
(C) two tungsten electrodes
(D) between two copper electrodes

39. Casting shapes which are axi-symmetrical in shapes are manufactured using casting.
- (A) Centrifuging (B) Centrifugal
(C) Sheave (D) None of these
40. Rotary swaging is the operation where the two dies which are free to move are held in a spindle which rotates continuously.
- (A) eccentrically (B) vertically
(C) elliptically (D) radially
41.non-conventional machining process in which "Xenon flash light" is some times used.
- (A) PAM (B) AJM
(C) LBM (D) USM
42. For supporting the pressure perpendicular to the axis of the shaft, the bearing preferred is :
- (A) Journal bearing (B) Footstep bearing
(C) Thrust bearing (D) Ball bearing

43. The action of a couple on a body if we change both the magnitudes of the forces and the arm of the couple in such a way that the moment of the couple remains unchanged.
- (A) does not change (B) always change
(C) becomes zero (D) can not be determined
44. When an open coiled helical spring (one end is fixed) in the vertical position is subjected to an axial tensile load and a couple, the strain energy stored will be due to
- (A) bending moment only
(B) torsional moment only
(C) both bending moment and torsional moment
(D) shear force only
45. An epicyclic gear have degrees of freedom has been utilized in the differential gear of an automobile.
- (A) one (B) two
(C) three (D) four

46. The number of teeth of a spur gear is 30 and it rotates at 200 RPM. If the gear has a module of 2, then the pitch line velocity will be :
- (A) 1256.6 mm/sec (B) 314.15 mm/sec
(C) 628.3 mm/sec (D) 942.45 mm/sec
47. Three litres of oil flows through an orifice of 20 mm diameter/second. The density of the oil is 800 kg/m^3 . If coefficient of discharge is 0.62, then the head of oil maintained will be :
- (A) 3.02 meter of oil (B) 6.04 meter of oil
(C) 9.08 meter of oil (D) 12.09 meter of oil
48. For one-dimensional transient heat conduction problems the graphical analysis can be done by method.
- (A) Graffer plot (B) Schmidt plot
(C) Sterling plot (D) Mohr's plot

49. Peclet number is the product of :
- (A) Reynold's number and Nusselt Number
 - (B) Reynold's number and Prandtl Number
 - (C) Prandtl number and Nusselt Number
 - (D) Poisson's number and Nusselt Number
50. For a control volume with an inlet area of 0.1 m^2 , exit area of 0.05 m^2 and the inlet velocity 30 m/sec , the force on the control volume will be (take density $= 3.89 \text{ kg/m}^3$ and constant) :
- (A) 175 N
 - (B) 350 N
 - (C) 700 N
 - (D) 525 N
51. For a given compression ratio and heat input per cycle, the cycle is more efficient than cycle.
- (A) Otto, Diesel
 - (B) Diesel, Otto
 - (C) Diesel, Ericsson
 - (D) None of these

52. Distortions in welding causes due to :
- (A) Impurities (B) Slag
(C) Shrinkage (D) Cavitation
53. Due to chilling of the castings the casting defect occurs is known as :
- (A) Swell (B) Drop
(C) Buckles (D) Hot spots
54. stop is one type of stop used in sheet metal as die stop.
- (A) Slab (B) Latch
(C) Hook (D) Barrel
55. In Vogel's approximation method; the opportunity cost associated with a row is determined by :
- (A) the difference between the smallest cost and the next smallest cost in the row
(B) the difference between the smallest unused cost and the next smallest unused cost in the row
(C) the difference between the smallest cost and next smallest unused cost in the row
(D) none of the above

56. If a cube lies behind V.P and above H.P, then cube is in :

(A) I-Quadrant

(B) II-Quadrant

(C) III-Quadrant

(D) IV-Quadrant

57. The absolute acceleration while dealing with relative motion may be considered as the geometric sum of

(A) base acceleration and relative acceleration

(B) relative acceleration and supplementary acceleration

(C) supplementary acceleration and based acceleration

(D) base acceleration, supplementary acceleration and relative acceleration

58. When a plane elemental body subjected to two mutually perpendicular direct stresses and a shear stress, the shear stress on principal plane will be :

(A) Infinity

(B) Zero

(C) Unity

(D) None of these

59. During balancing of inline engines, if a mass is transferred to the crankpin, the axial component parallel to the cylinder axis of the resulting centrifugal force represents
- (A) any balanced force
 - (B) the tertiary balanced force
 - (C) the tertiary vertical force
 - (D) the primary unbalanced force
60. A Thompson indicator employs :
- (A) Pantograph mechanism
 - (B) Grass-hopper mechanism
 - (C) Kemtpe's mechanism
 - (D) Tchebicheff mechanism
61. In Francis turbine, the spiral casing surrounds the completely.
- (A) shaft
 - (B) runner
 - (C) penstock
 - (D) governor

62. The effect of scales, deposits, rust formation etc. formed in heat exchanger can be taken care by introducing additional thermal resistance, called :
- (A) caulking resistance (B) peeling resistance
(C) fouling resistance (D) dripping resistance
63. The boundary condition which describes the process of conduction between two bodies in perfect contact is known as :
- (A) Boundary condition of the first kind
(B) Boundary condition of the second kind
(C) Boundary condition of the third kind
(D) Boundary condition of the fourth kind
64. While dealing with fluid-rotor energy transfer related cases, the term "degree of reaction" for a given machine :
- (A) is always positive
(B) is always negative
(C) is always zero
(D) may be positive or negative

65. In a moist air mixture, the dew point temperature is the wet bulb temperature.
- (A) more than (B) less than
(C) always equal to (D) not comparable to
66. During welding, if a long and continuous visual separation line between the base metal and the HAZ appears, it is known as :
- (A) porosity (B) hot cracking
(C) undercut (D) lamellar tearing
67. type of pattern can be used when the contour of the part is such that withdrawing the pattern from the mould is not possible due to obstructing part.
- (A) Follow board (B) Skeleton
(C) Loose piece (D) Sweep

68. If joint angles are given, and the position is required to be determined for the robot, then it is a case of :
- (A) Trigonometric kinematics (B) Forward kinematics
(C) Inverse kinematics (D) Inverse dynamics
69. Hungarian method is used for :
- (A) LPP (B) Material handling
(C) Assignment problem (D) Queuing problem
70. When the shafts are slightly misaligned then most suitable coupling to connect them is :
- (A) Rigid coupling (B) Flexible coupling
(C) Oldham-hook coupling (D) None of these
71. In an automobile "wheel base" is the distance between centre of the wheel to the centre of the wheel.
- (A) left front, left rear (B) left front, right rear
(C) right front, left rear (D) left rear, right rear

72. Example for machine tool is :
- (A) single point tool (B) grinding wheel
(C) milling machine (D) drill bit
73. In NC part programming, the G-code used for "circular interpolation (counter-clockwise)" is :
- (A) G91 (B) G28
(C) G08 (D) G03
74. is used for 'Two Wire Method' to measure effective diameter of a screw thread.
- (A) Diameter measuring machine (B) Micro-diameter guage
(C) Macro-diameter gauge (D) Collimator
75. AJM is best suited for machining
- (A) nano-ductile materials (B) brittle materials
(C) plastics (D) fibres

76. Cutting ratio is the ratio of :
- (A) uncut chip thickness to chip width
 - (B) uncut chip length to chip thickness
 - (C) uncut chip width to chip length
 - (D) uncut chip thickness to chip thickness
77. In a Taylor's differential piece-rate system followed.
- (A) 8 piece rates are
 - (B) 1 piece rate is
 - (C) 2 piece rates are
 - (D) infinite piece rates are
78. test is used to determine the scratch hardness of a thin material.
- (A) Mohr's scale of hardness
 - (B) Shore scleroscope hardness
 - (C) File hardness
 - (D) None of the above

79. ATC is commonly used in :
- (A) CNC ECM (B) CNC machining centre
(C) Conventional shaper (D) NC PAM
80. Goose-neck injector is used in process.
- (A) precision investment casting
(B) shell moulding
(C) sand casting
(D) hot chamber die casting
81. When was Pradhan Mantri Jan Dhan Yojna launched in H.P. ?
- (A) 15 August, 2014 (B) 28 August, 2014
(C) 19 September, 2014 (D) 2nd October, 2014
82. At which place in Hamirpur District of H.P. is the HPMC setting up a vegetable pack house and cold room ?
- (A) Nadaun (B) Rail
(C) Bhota (D) Sujanpur

83. In which year was Rajiv Gandhi Anna Yojna launched in H.P. ?
- (A) 2011 (B) 2012
(C) 2013 (D) 2014
84. On which stream is Sawra Kuddu Hydel Power Project ?
- (A) Tons (B) Giri
(C) Ghanvi (D) Pabbar
85. Which Raja of Kangra fell into a dry well while hunting and was presumed dead ?
- (A) Hari Chand (B) Fateh Chand
(C) Dhian Chand (D) Anirudh Chand
86. With which region of H.P. is Sen dance associated ?
- (A) Sirmaur (B) Rohru-Jubbal
(C) Pangi (D) Handoor

87. Which princely state's account is contained in Ganesh Singh's *Shashi Vansh Vinod* ?
- (A) Jubbal (B) Kangra
(C) Sirmaur (D) Bilaspur
88. When was Panchayati Raj system introduced in H.P. for the first time ?
- (A) 1952 (B) 1957
(C) 1963 (D) 1994
89. Who became the chairman of H.P. Territorial Council in 1957 ?
- (A) Thakur Ram Lal (B) Dr. Y.S. Parmar
(C) Thakur Karam Singh (D) Padam Dev
90. Which leader of Mandi princely state was convicted in Lahore conspiracy case ?
- (A) Pandit Gauri Prasad (B) Hirdaya Ram
(C) Hardev (D) Mian Jawahar Singh

91. In which state of India are Olive Ridley Turtles found ?

(A) Gujarat

(B) Tamil Nadu

(C) Kerala

(D) Odisha

92. With which state of India is Lavani dance associated ?

(A) Asom

(B) Arunachal Pradesh

(C) Manipur

(D) Maharashtra

93. Who was the first Indian to be charged with sedition ?

(A) Lala Lajpatrai

(B) Jogendra Chand Bose

(C) Mangal Pande

(D) None of these

94. Persons of which age-group are eligible under the Atal Pension Yojna ?

(A) 16-60 years

(B) 20-50 years

(C) 18-40 years

(D) 20-70 years

95. How many cities of Madhya Pradesh have been included in the first list of smart cities released in January 2016 ?

(A) One

(B) Two

(C) Three

(D) Four

96. When will the President of United States be elected by the electoral college ?

(A) Tuesday November 8, 2016

(B) Wednesday November 16, 2016

(C) Tuesday November 15, 2016

(D) None of the above

97. In which field did Angus Deaton win Nobel prize in 2015 ?

(A) Physics

(B) Chemistry

(C) Medicine

(D) Economics

98. Who is Tsai Ing-Wen ?

- (A) President of Taiwan
- (B) Prime Minister of Cambodia
- (C) Foreign Minister of North Korea
- (D) Prime Minister of Laos

99. Identify the Indian origin cancer expert who was knighted by Queen Elizabeth in the new year honours list released on December 31, 2015 :

- (A) Hardev Singh
- (B) Hardyal Singh
- (C) Daljit Singh
- (D) Harpal Singh Kumar

100. Which one of the following countries is *not* a member of ASEAN ?

- (A) Vietnam
- (B) Brunie
- (C) Laos
- (D) Japan