

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO**TEST BOOKLET SERIES****TEST BOOKLET****AP(ME)-2017**

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. **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. Write your Roll Number only in the box provided alongside.
Do not write anything else on the Test Booklet.
4. 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.
5. 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 :

Ⓐ
Ⓑ
●
Ⓓ
6. 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.
7. 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.*
8. 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 and 1/4 (0.25) of the marks will be deducted as penalty for wrong answers.
9. 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.
10. 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.
11. After you have completed the test, hand over the Answer Sheet only, to the Invigilator.

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1. The barometric pressure at the base of a mountain is 750 mm Hg and at the top 600 mm Hg. If the average air density is 1 kg/m^3 , the height of the mountain is approximately :

(A) 2000 m	(B) 3000 m
(C) 4000 m	(D) 5000 m

2. The heat transferred by conduction, convection and radiation in :

(A) Melting of ice
(B) Boiler furnaces
(C) Condensation of steam in condenser
(D) None of the above

3. The air standard efficiency of diesel cycle will be less than that of Otto cycle in the case of :

(A) Same compression ratio and same heat input
(B) Same maximum pressure and same heat input
(C) Same maximum pressure and same output
(D) Same maximum pressure and same maximum temperature

4. Military type of organization is known as :
- (A) Line organization
 - (B) Functional organization
 - (C) Line and staff organization
 - (D) Line, staff and functional organization
5. Stress concentration is caused due to :
- (A) Variation in load acting on a member
 - (B) Variation in properties of materials in a member
 - (C) Abrupt change in cross section
 - (D) All of the above
6. If the cutting speed is increased, then the built-up edge :
- (A) Becomes longer
 - (B) May or may not form
 - (C) Becomes smaller and finally does not form at all
 - (D) Has nothing to do with speed

7. In vapour compression refrigerator system, a throttle valve is used in place of an expander because :
- (A) It considerably reduces mass of the system
 - (B) It improves the C.O.P., as the condenser is small
 - (C) The positive work in isentropic expansion of liquid is very small
 - (D) It leads to significant cost reduction
8. A steel bar of 15 mm is heated from 15°C to 50°C and it is free to expand. The bar will induce :
- (A) No stress
 - (B) Shear stress
 - (C) Tensile stress
 - (D) Compressive stress
9. The Gibbs free-energy function is a property comprising :
- (A) Pressure, volume and temperature
 - (B) Enthalpy, temperature and entropy
 - (C) Temperature, pressure and enthalpy
 - (D) Volume, enthalpy and entropy

10. A point on a connecting link (excluding end points) of a double slider crank mechanism traces a :
- (A) Straight line path
 - (B) Hyperbolic path
 - (C) Parabolic path
 - (D) Elliptical path
11. The pressure of a liquid measured with the help of a piezometer tube is :
- (A) Vacuum pressure
 - (B) Gauge pressure
 - (C) Absolute pressure
 - (D) Atmospheric pressure
12. A steam pipe is to be lined with two layers of insulating materials of different thermal conductivities. For minimum heat transfer :
- (A) the better insulation must be put inside
 - (B) the better insulation must be put outside
 - (C) one could place either insulation on either side
 - (D) one should take into account the steam temperature before deciding as to which insulation is put where

13. Stoichiometric ratio is :
- (A) Chemical correct air-fuel ratio by weight
 - (B) Chemical correct air-fuel ratio by volume
 - (C) Air-fuel ratio for maximum efficiency
 - (D) None of the above
14. The interchangeability can be achieved by :
- (A) standardisation
 - (B) better process planning
 - (C) bonus plan
 - (D) better product planning
15. Auto frettage is the method of :
- (A) joining thick cylinders
 - (B) pre-stressing thick cylinders
 - (C) calculating stresses in thick cylinders
 - (D) increasing the life of thick cylinders
16. The thrust force will increase with the increase in :
- (A) side cutting edge angle
 - (B) tool nose radius
 - (C) rake angle
 - (D) end cutting edge angle

17. In a lithium bromide absorption refrigeration system :
- (A) lithium bromide is used as a refrigerant and water as an absorbent
 - (B) water is used as a refrigerant and lithium bromide as an absorbent
 - (C) ammonia is used as a refrigerant and lithium bromide as an absorbent
 - (D) none of the above
18. The unit of elastic modulus is the same as those of :
- (A) Stress, shear modulus and pressure
 - (B) Strain, shear modulus and force
 - (C) Shear modulus, stress and force
 - (D) Stress, strain and pressure
19. The Coriolis component of acceleration is taken into account for :
- (A) slider crank mechanism
 - (B) four bar chain mechanism
 - (C) quick return motion mechanism
 - (D) all of the above

20. An instrument which offers no obstruction to the flow, offers no additional loss and is suitable for flow rate measurement is :
- (A) Venturimeter
 - (B) Rotameter
 - (C) Magnetic flow meter
 - (D) Bend meter
21. Up to critical radius of insulation :
- (A) added insulation will increase heat loss
 - (B) added insulation will decrease heat loss
 - (C) convective heat loss will be less than conductive heat loss
 - (D) heat flux will decrease
22. Which of the following symptoms shows that the combustion in air is necessarily complete ?
- (A) Absence of oxygen in exhaust
 - (B) Absence of nitrogen in exhaust
 - (C) Absence of free carbon in exhaust
 - (D) Absence of carbon monoxide in exhaust

23. In a steam engine, the valve rod is connected to an eccentric rod by means of :
- (A) cotter joint (B) knuckle joint
(C) universal joint (D) flange coupling
24. Crater wear occurs mainly on the :
- (A) nose part, front relief face and side relief face of the cutting tool
(B) cutting edge only
(C) front face only
(D) face of the cutting tool at a short distance from the cutting edge only
25. A reversible engine has ideal thermal efficiency of 30%. When it is used as a refrigerating machine with all other conditions unchanged, the coefficient of performance will be :
- (A) 3.33 (B) 3.00
(C) 2.33 (D) 1.33
26. The Young's modulus of elasticity of a material is 2.5 times its modulus of rigidity. The Poisson's ratio for the material will be :
- (A) 0.25 (B) 0.33
(C) 0.50 (D) 0.75

27. The thermal efficiency of the Carnot engine is 0.5. If the engine is operated as refrigerator, what is the COP of the refrigerator ?
- (A) 0.5 (B) 1.0
(C) 2.0 (D) 2.5
28. In involute gears, the pressure angle is :
- (A) dependent on size of teeth
(B) dependent on size of gears
(C) always constant
(D) always variable
29. The rotor of a ship rotates in clockwise direction when viewed from stern and the ship takes a left turn. The effect of gyroscopic couple acting on it will be :
- (A) to raise the bow and stern
(B) to lower the bow and stern
(C) to raise the bow and lower the stern
(D) to raise the stern and lower the bow

30. The enthalpy of vaporization, at critical point is :
- (A) maximum (B) minimum
(C) zero (D) none of these
31. A horizontal beam under bending has a maximum bending stress of 100 M Pa and a maximum shear stress of 20 M Pa. What is the maximum principal stress in the beam ?
- (A) 20 (B) 50
(C) $50 + \sqrt{2900}$ (D) 100
32. The colour of the flame of halide torch, in case of leakage of Freon refrigerant, will change to :
- (A) bright green (B) yellow
(C) red (D) orange
33. The grinding of long, slender shafts or bars is usually done by :
- (A) infeed grinding
(B) through feed grinding
(C) end feed grinding
(D) any one of these

37. Usually fins are provided to increase the rate of heat transfer. But fins also act as insulation. Which one of the following non-dimensional numbers decides this factor ?
- (A) Eckert number (B) Biot number
(C) Fourier number (D) Peclet number
38. The square root of the ratio of inertia force to gravity force is called :
- (A) Reynolds number (B) Froude number
(C) Mach number (D) Euler number
39. The Klein's diagram is used when :
- (A) crank has uniform angular velocity
(B) crank has non-uniform angular velocity
(C) crank has uniform angular acceleration
(D) crank has non-uniform angular acceleration
40. Thermodynamic work is the product of :
- (A) Two intensive properties
(B) Two extensive properties
(C) An intensive property and change in an extensive property
(D) An extensive property and change in an intensive property

41. If a block of material of length 25 cm, breadth 10 cm and height 5 cm undergoes a volumetric strain of $1/5000$, then change in volume will be :
- (A) 0.50 cm^3 (B) 0.25 cm^3
(C) 0.20 cm^3 (D) 0.75 cm^3
42. The heat generated in metal cutting can conveniently be determined by :
- (A) Installing thermocouple on the job
(B) Installing thermocouple on the tool
(C) Calorimetric set up
(D) Using radiation pyrometer
43. In the multiple disc clutch, if there are 6 discs on the driving shaft and 5 discs on the driven shaft, then the number of pairs of contact surfaces will be equal to :
- (A) 11 (B) 12
(C) 22 (D) 10

44. A production line is said to be balanced when :
- (A) There are equal number of machines at each work station
 - (B) There are equal number of operators at each work station
 - (C) The waiting time for service at each station is the same
 - (D) The operation time at each station is the same.
45. Morse test can be conducted for :
- (A) petrol engines
 - (B) diesel engines
 - (C) multi-cylinder engines
 - (D) all of these
46. Fraction of radiative energy leaving one surface that strikes the other surface is called :
- (A) Radiative flux
 - (B) Emissive power of the first surface
 - (C) View factor
 - (D) Re-radiation flux

47. In order to measure the flow with a venturimeter, it is installed in :
- (A) horizontal line
 - (B) inclined line with flow upward
 - (C) inclined line with flow downward
 - (D) any direction and in any location
48. An air vessel is provided at the summit in a syphon to :
- (A) avoid interruption in the flow
 - (B) increase discharge
 - (C) increase velocity
 - (D) maintain pressure difference
49. Which one of the following modifications to a Rankine cycle would upgrade/enhance its efficiency so as to approach that of Carnot cycle ?
- (A) Incomplete expansion of steam
 - (B) Reheating of steam
 - (C) Regenerative feed heating by steam
 - (D) Partial condensation of steam

50. Intercooling in multistage compressors is done :
- (A) to cool the air during compression
 - (B) to cool the air at delivery
 - (C) to enable compression in two stages
 - (D) to minimize the work of compression
51. The variance of the completion time for a project is the sum of variances of :
- (A) All activity times
 - (B) Non-critical activity times
 - (C) Critical activity times
 - (D) Activity times of first and last activities of the project
52. How can interference in involute gears be avoided ?
- (A) Varying the centre distance by changing the pressure angle only
 - (B) Using modified involute or composite system only
 - (C) Increasing the addendum of small wheel and reducing it for the larger wheel only
 - (D) Any of the above

53. The process of changing the shape of grinding wheel as it becomes worn due to breaking away of the abrasive and bond, is called :
- (A) truing (B) dressing
(C) facing (D) clearing
54. The critical temperature is the temperature :
- (A) below which a gas does not obey gas law
(B) above which a gas may explode
(C) below which a gas is always liquefied
(D) above which a gas is never liquefied
55. Which of the following governors is used to drive a gramophone ?
- (A) watt governor (B) porter governor
(C) Pickering governor (D) Hartnell governor
56. In which one of the following processes is there an increase in entropy with no degradation of energy ?
- (A) Polytropic expansion
(B) Isothermal expansion
(C) Isochoric heat addition
(D) Isobaric heat addition

57. An open-coiled helical spring of mean diameter D , number of coils N and wire diameter d is subjected to an axial force P . The wire of the spring is subject to :
- (A) direct shear only
 - (B) combined shear and bending only
 - (C) combined shear, bending and twisting
 - (D) combined shear and twisting only
58. Whirling speed of shaft is the speed at which :
- (A) shaft tends to vibrate in longitudinal direction
 - (B) torsional vibration occurs
 - (C) shaft tends to vibrate vigorously in transverse direction
 - (D) combination of transverse and longitudinal vibration occurs
59. The object of caulking in a riveted joint is to make the joint :
- (A) free from corrosion
 - (B) stronger in tension
 - (C) free from stress
 - (D) leak proof

60. In a psychrometric chart, specific humidity lines are :
- (A) vertical and uniformly space
 - (B) horizontal and uniformly space
 - (C) horizontal and non-uniformly space
 - (D) curved lines
61. Internal gears can be made by :
- (A) hobbing
 - (B) shaping with pinion cutter
 - (C) shaping with rack cutter
 - (D) milling
62. In a journal bearing P = average bearing pressure, Z = absolute viscosity of the lubricant, N = rotational speed of the journal. The bearing characteristic number is given by :
- (A) ZN/p
 - (B) p/ZN
 - (C) Z/pN
 - (D) N/Zp

63. 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 ?
- (A) 0.180 (B) 0.200
(C) 0.220 (D) 0.240
64. The stagnation pressure rise in a centrifugal compressor takes place :
- (A) in the diffuser only
(B) in the impeller only
(C) in the diffuser and impeller
(D) in the inlet guide vanes only
65. In steam and other vapour cycles, the process of removing non-condensable is called :
- (A) Scavenging process
(B) Deaeration process
(C) Exhaust process
(D) Condensation process

66. The shear stress in turbulent flow is :
- (A) Linearly proportional to the velocity gradient
 - (B) Proportional to the square of the velocity gradient
 - (C) Dependent on the mean velocity of flow
 - (D) Due to the exchange of energy between the molecules
67. In a simple impulse turbine, the nozzle angle at the entrance is 30° . What will be the blade-speed ratio for maximum diagram efficiency ?
- (A) 0.433
 - (B) 0.25
 - (C) 0.5
 - (D) 0.75
68. For air standard Brayton cycle, increase in the maximum temperature of the cycle, while keeping the pressure ratio the same would result in :
- (A) Increase in air standard efficiency
 - (B) Decrease in air standard efficiency
 - (C) No change in air standard efficiency
 - (D) Increase in the efficiency but reduction in network

69. Multiple threads are used to secure :
- (A) low efficiency
 - (B) high efficiency
 - (C) high load lifting capacity
 - (D) high mechanical advantage
70. Which of the following statements is *wrong* about ultrasonic machining ?
- (A) It is best suited for machining hard and brittle materials
 - (B) It cuts materials at very slow speed
 - (C) It removes large amount of materials
 - (D) It produces good surface finish
71. During sensible cooling :
- (A) relative humidity remains constant
 - (B) wet bulb temperature increases
 - (C) specific humidity increases
 - (D) partial pressure of vapour remains constant

72. Lamé's theory is associated with :
- (A) thin cylindrical shells
 - (B) thick cylindrical shells
 - (C) direct and bending stresses
 - (D) none of the above
73. Two rotors are mounted on a shaft. If the unbalanced force due to one rotor is equal in magnitude to the unbalanced force due to the other rotor, but positioned exactly 180° apart, then the system will be balanced :
- (A) statically
 - (B) dynamically
 - (C) statically as well as dynamically
 - (D) neither statically nor dynamically
74. The critical depth meter is used to measure :
- (A) velocity of flow in an open channel
 - (B) depth of flow in an open channel
 - (C) depth of channel
 - (D) hydraulic jump

75. The degree of reaction of a turbine is the ratio of enthalpy drop in :
- (A) Moving blades to enthalpy drop in the stage
 - (B) Fixed blades to enthalpy drop in the stage
 - (C) Moving blades to enthalpy drop in fixed blades
 - (D) Fixed blades to enthalpy drop in moving blades
76. A gas turbine plant working on Joule cycle produces 4000 kW of power. If its work ratio is 40%, what is the power consumed by the compressor ?
- (A) 2000 kW
 - (B) 4000 kW
 - (C) 6000 kW
 - (D) 8000 kW
77. Deep groove ball bearings are used for :
- (A) heavy thrust load
 - (B) small angular displacement of shafts
 - (C) radial load at high speed
 - (D) combined thrust and radial load at high speed
78. For air conditioning the operation theatre in a hospital, the percentage of outside air in the air supplied is :
- (A) Zero
 - (B) 20
 - (C) 50
 - (D) 100

79. The slenderness ratio is the ratio of :
- (A) area of column to least radius of gyration
 - (B) length of column to least radius of gyration
 - (C) least radius of gyration to area of column
 - (D) least radius of gyration to length of column
80. The gas constant (R) are equal to the :
- (A) sum of two specific heats
 - (B) difference of two specific heats
 - (C) product of two specific heats
 - (D) ratio of two specific heats
81. Which lake is the source of Bhaga river of H.P. ?
- (A) Mantilai
 - (B) Surajtal
 - (C) Saketi
 - (D) Kunt Bhayog
82. Which is the longest river in H.P. ?
- (A) Ravi
 - (B) Chenab
 - (C) Sutlej
 - (D) Yamuna

83. In which district of H.P. is Gauri Devi Ka Tibba peak ?
- (A) Chamba (B) Kullu
(C) Kinnaur (D) Bilaspur
84. According to 2008 AD notification which of the following is *not* included in the list of difficult and inaccessible areas in H.P. ?
- (A) Sangrah (Sirmaur)
(B) Dodra Kwar (Shimla)
(C) Chhota Banghal (Kangra)
(D) Nirmand (Kullu)
85. At which place does the Govt. of H.P. propose to set up a mother station for CNG buses ?
- (A) Baijnath (Kangra)
(B) Dharampur (Mandi)
(C) Haroli (Una)
(D) Bhoti (Hamirpur)

86. Which occupational group in H.P. thrives largely on offerings on the occasion of death rites of Hindus ?
- (A) Bhat (B) Khatik
(C) Purohit (D) Acharaj
87. Which one of the following projects is in public sector ?
- (A) Thirot (B) Toss
(C) Sumez (D) Kurmi
88. At which place in Kangra District of H.P. a state of Art Industrial Area is being created ?
- (A) Ranital (B) Dehra
(C) Harchakian (D) Kandrori
89. From which Rabi season the H.P. Govt. has introduced the Crop Insurance Scheme ?
- (A) 1999-2000 (B) 2004-2005
(C) 2008-2009 (D) 2010-2011

90. At which place in Sirmaur District of H.P. a Smart Grid Pilot is being implemented by the H.P. State Electricity Board ?
- (A) Sangrah (B) Kala Amb
(C) Dadahu (D) None of these
91. Which team did Indian Men's Hockey team defeat at the Rio Olympics 2016 ?
- (A) Canada (B) Germany
(C) Argentina (D) Belgium
92. Who is the Chairman of All Party Hurriyat Conference ?
- (A) Mirwaj Umar Farooq
(B) Syed Ali Shah Gilani
(C) Yasin Malik
(D) None of the above
93. Where did Sattriya dance originate ?
- (A) Andhra Pradesh (B) Kerala
(C) Asom (D) Odisha

94. What is the minimum number of states that must approve the Goods and Services Tax (GST) Bill before it is sent to the President ?
- (A) 14 (B) 15
(C) 16 (D) 18
95. With which of the following is Bezwada Wilson, the winner of Magsaysay award, associated ?
- (A) Inclusiveness in culture
(B) Opposition to child labour
(C) Women liberation
(D) Safai Karmchari Andolan
96. Which country is called The Queen of Seas ?
- (A) Italy (B) Belgium
(C) Britain (D) Canada
97. When did Islamic State gun-men kill nearly 129 people in Paris in terrorist attack ?
- (A) October 13, 2015 (B) November 13, 2015
(C) December 13, 2015 (D) January 13, 2016

98. Which country of the world occupies first position in 'Good Country Index-2015' which seeks to measure how countries contribute to the global good ?
- (A) Norway (B) Sweden
(C) Denmark (D) None of these
99. From which country did Solar Impulse-2 begin and conclude its round the world trip during 2015-16 ?
- (A) Saudi Arabia
(B) United Arab Emirates
(C) Oman
(D) Kuwait
100. In which country did Soyuz capsule which brought back three astronauts of Britain, Russia and the United States land on June 18, 2016 ?
- (A) Kazakhstan (B) Uzbekistan
(C) Kyrgyzstan (D) Turkmenistan