

**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 :  

(A)   (B)   ●   (D)
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.

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1. Total inventory cost consists of :  
(A) 3 cost components (B) 2 cost components  
(C) 4 cost components (D) 5 cost components
  
2. Value is the ratio of :  
(A) Productivity/cost (B) Output/cost  
(C) Output/input (D) Utility/cost
  
3. A thin cylinder of inner radius 500 mm and thickness 10 mm subjected to an internal pressure of 5 MPa. The average circumferential (hoop) stress in MPa is :  
(A) 100 (B) 250  
(C) 500 (D) 1000

4. Wastivity of any system is defined as the ratio of :
- (A) Waste/output (B) Waste/input  
(C) Output/waste (D) Input/waste
5. Work transfer between the system and the surroundings :
- (A) is a point function  
(B) is always given by  $\int p dv$   
(C) is a function of pressure only  
(D) depends on the path followed by the system
6. Which analysis is *not* related to inventory control ?
- (A) ABC Analysis (B) VED Analysis  
(C) FSN Analysis (D) FMS Analysis
7. A spur gear has a module of 3 mm, number of teeth 16, face width 36 mm, and a pressure angle of 20 degree. It is transmitting a power of 3 kW at 20 rev/s. Taking a velocity factor of 1.5 and a form factor of 0.3, the stress in the gear tooth in MPa will be :
- (A) 32 (B) 46  
(C) 58 (D) 70

8. Which one is *not* the input to MRP system ?
- (A) Master production schedule
  - (B) Bill of materials
  - (C) Inventory status file
  - (D) Management information system file
9. Existence of velocity potential implies that :
- (A) Fluid is continuum
  - (B) Fluid is irrotational
  - (C) Fluid is ideal
  - (D) Fluid is compressible
10. A solar energy based heat engine which receives 80 kJ of heat at 100 deg C and rejects 70 kJ of heat to the ambient at 30 deg C is to be designed. The thermal efficiency of the heat engine is :
- (A) 70%
  - (B) 1.88%
  - (C) 12.5%
  - (D) Indeterminate



14. Internal gear cutting operation can be performed by :
- (A) Milling
  - (B) Shaping with rack cutter
  - (C) Shaping with pinion cutter
  - (D) Hobbing
15. The power output from a spark ignition engine is varied by :
- (A) Changing the ignition temperature
  - (B) Regulating the amount of air fuel inducted
  - (C) Regulating the amount of air fuel mixture
  - (D) Regulating the amount of fuel
16. The silencer of internal combustion engine :
- (A) Reduces noise
  - (B) Decrease break specific fuel consumption
  - (C) Increase break specific fuel consumption
  - (D) Has no effect on its efficiency

17. In a vapour compression refrigeration system, liquids to suction heat exchanger is used to :
- (A) Keep the COP constant
  - (B) Prevent the liquid refrigerant from entering the compressor
  - (C) Sub cool the liquid refrigerant leaving the condenser
  - (D) Sub cool the vapour refrigerant from the evaporator
18. MRP-II includes additional areas which are not part of MRP; are :
- (A) Research and Development
  - (B) Finance and marketing
  - (C) Purchase and stores
  - (D) Organization and control
19. An economizer in a steam generator performs the function of :
- (A) Preheating the combustion air
  - (B) Preheating the feed water
  - (C) Preheating the input fuel
  - (D) Raising the temperature of steam



23. It is proposed to coat a 1 mm diameter wire with enamel paint ( $k = 0.1 \text{ W/mK}$ ) to increase heat transfer with air. If the air side heat transfer coefficient is  $100 \text{ W/m}^2\text{K}$ , the optimum thickness of enamel paint should be :
- (A) 0.25 mm (B) 0.5 mm  
(C) 1 mm (D) 2 mm
24. Military organization is known as :
- (A) Line organization (B) Line and staff organization  
(C) Functional organization (D) Matrix organization
25. The pressure drop for laminar flow of a liquid in a smooth pipe at normal temperature and pressure is :
- (A) Directly proportional to density  
(B) Inversely proportional to density  
(C) Independent of density  
(D) Proportional to  $(\text{density})^{0.75}$

26. Oil flows through a pipe of 200 mm diameter (friction factor 0.0225) of length 500 m. The volumetric flow rate is  $0.2 \text{ m}^3/\text{s}$ . The head loss in m due to friction is :
- (A) 116.18 (B) 0.116  
(C) 18.22 (D) 232.36
27. A band brake having bandwidth of 80 mm, drum diameter of 250 mm, coefficient of friction 0.25 and angle of wrap 270 degrees is required to exert a friction torque of 1000 Nm. The maximum tension in kN developed in the band is :
- (A) 1.88 (B) 3.56  
(C) 6.12 (D) 11.56
28. For resistance spot welding of 1.5 mm thick steel sheets, the current required is of the order :
- (A) 10 Amp (B) 100 Amp  
(C) 1000 Amp (D) 10000 Amp

29. In DC welding, the straight polarity (electrode negative) results in :
- (A) Lower penetration (B) Lower deposition rate  
(C) Less heating of work piece (D) Smaller weld pool
30. Functional organization was developed by :
- (A) Frank Gilbreth (B) F.W. Taylor  
(C) ASME (D) Gantt
31. Wrinkling is a common defect found in :
- (A) Bent components (B) Deep drawn components  
(C) Embossed components (D) Blanked component
32. The cutting force in punching and blanking operations mainly depends on :
- (A) The modulus of elasticity of material  
(B) The shear strength of material  
(C) The bulk modulus of material  
(D) The yield strength of material

33. In machine shop, pins of 15 mm diameter are produced at a rate of 1000 per month and the same is consumed at 500 per month. The production and consumption continue simultaneously till maximum inventory is achieved. Then inventory is allowed to reach zero due to consumption. The lot size of production is zero. If backlog is not allowed, max inventory level is :
- (A) 400 (B) 500  
(C) 600 (D) 700
34. A company uses 2555 units for an item annually. Delivery lead time is 8 days. The reorder point (in number of units) to achieve optimum inventory is :
- (A) 7 (B) 8  
(C) 56 (D) 60
35. Functional organization is :
- (A) Less differentiated and more diffused  
(B) More differentiated and longer term  
(C) More differentiated and focused  
(D) Goal orientation

36. The word kanban is most appropriately associated with :
- (A) Economic order quantity                      (B) Just in time production  
(C) Capacity planning                              (D) Product design
37. A positive value of Joule Thomson coefficient of a fluid means :
- (A) Temperature drops during throttling  
(B) Temperature remains constant during throttling  
(C) Temperature rises during throttling  
(D) None of the above
38. In an ideal vapour compression refrigeration cycle, the specific enthalpy of refrigerant (in kJ/kg) at the following states is given as :
- Inlet of condenser : 283  
Exit of condenser : 116  
Exit of evaporator : 232
- The COP of this cycle is
- (A) 2.27                                                      (B) 2.75  
(C) 3.27                                                      (D) 3.75

39. Matrix organization includes :

- (A) Focusing of undivided human effort on two (or more) essential organizational tasks simultaneously
- (B) Formality of structure
- (C) Time orientation
- (D) Confrontation

40. A 60 mm long and 6 mm thick fillet weld carries a steady load of 15 kN along the weld. The shear strength of the weld material is equal to 200 MPa. The factor of safety is :

- (A) 2.4
- (B) 3.4
- (C) 4.8
- (D) 6.8

41. A cylindrical elastic body subjected to pure torsion about its axis develops :

- (A) Tensile stress in a direction  $45^\circ$  to the axis
- (B) No tensile or compressive stress
- (C) Max shear stress along the axis of shaft
- (D) Max shear stress at  $45^\circ$  to the axis

42. A steel bar of 40 mm × 40 mm square cross-section is subjected to an axial compressive load of 200 kN. If the length of the bar is 2 m and  $E = 200$  GPa, the contraction in mm of the bar will be :
- (A) 1.25 (B) 2.7  
(C) 4.05 (D) 5.4
43. Induction and orientation are part of the following human resource management functions :
- (A) Recruitment (B) Training  
(C) Re-training (D) Skill development
44. An elastic body is subjected to a tensile stress  $X$  in a particular direction and a compressive stress  $Y$  in its perpendicular direction.  $X$  and  $Y$  are unequal in magnitude. On the plane of maximum shear stress in the body there will be :
- (A) No normal stress  
(B) Also the maximum normal stress  
(C) The minimum normal stress  
(D) Both normal and shear stress

45. If the length of a column is doubled, the critical load becomes :
- (A)  $1/2$  of the original value      (B)  $1/4$  of the original value  
(C)  $1/8$  of the original value      (D)  $1/16$  of the original value
46. In a cam follower mechanism, the follower needs to rise through 20 mm during  $60^\circ$  of cam rotation, the first  $30^\circ$  with a constant acceleration and then with a deceleration of the same magnitude. The initial and final speeds of the follower are zero. The cam rotates at uniform speed of 300 r.p.m. The max speed in m/s of the follower is :
- (A) 0.60      (B) 1.20  
(C) 1.68      (D) 2.40
47. Tooth interference in an external involute spur gear pair can be reduced by :
- (A) Decreasing centre distance between gear pair  
(B) Decreasing module  
(C) Decreasing pressure angle  
(D) Increasing number of gear tooth

48. If two nodes are observed at a frequency of 1800 r.p.m. during whirling of simply supported long slender rotating shaft, the first critical speed of the shaft in r.p.m. is :

(A) 200

(B) 450

(C) 600

(D) 900

49. Anthropology is one of the disciplines of human resource management, which deals with :

(A) Measurement and analysis of physical factors in achieving efficiency

(B) Development of a socio-technical model for employees health and safety improvement

(C) Cultural variations and discoverable patterns of behavior from history and environment

(D) Allocation of scarce resources with orientation to future

50. Benchmarking is used to develop objectives by :
- (A) Obtaining reports from the government
  - (B) Using SMART objectives
  - (C) Making comparisons with excellent/best practice companies
  - (D) Listening to suggestions from employees
51. A company requires 9000 units of a product annually. It costs Rs. 3 per unit the cost per purchase order is Rs. 300 and the inventory carrying cost per unit year is 20% of the unit cost. The economic order quantity (EOQ) for the company is :
- (A) 4000 units
  - (B) 3500 units
  - (C) 3000 units
  - (D) 5000 units
52. The time elapsed between the placing of an order and its arrival is called as :
- (A) Cycle time
  - (B) Lead time
  - (C) Variable demand rate
  - (D) Production rate

53. ISO stands for :

- (A) International Standards Organization
- (B) Indian Standards Organization
- (C) International Organization for Standards
- (D) International Specification for Organizations

54. Which quality award is international quality award ?

- (A) Rajiv Gandhi National Quality Award
- (B) Deming Prize
- (C) Malcolm Baldrige National Quality Award
- (D) Pakistan National Quality Award

55. Just-in-time manufacturing concept is based on :

- (A) Reduction of production
- (B) Reduction of waste
- (C) Reduction of inspection
- (D) Reduction of defects

56. Which one of is *not* a type of quality cost ?
- (A) Appraisal cost (B) Prevention cost  
(C) Internal failure cost (D) Production cost
57. Quality means :
- (A) more investment in technology  
(B) increasing number of inspectors  
(C) increasing production  
(D) doing first time right
58. Number of factors in ISO 9001 are :
- (A) 20 (B) 18  
(C) 15 (D) 10
59. In PERT network, expected time estimate is calculated as :
- (A)  $t_e = (t_o + 4t_m + t_p)/6$  (B)  $t_e = (4t_o + t_m + t_p)/6$   
(C)  $t_e = (t_o + t_m + 4t_p)/6$  (D)  $t_e = (t_o + t_m + t_p)/6$

60. PERT is based on the assumption of :

- (A) Normal distribution of time estimates
- (B) Exponential distribution of time estimates
- (C) Beta distribution of time estimates
- (D) Gamma distribution of time estimates

61. Which one is *not* a type of plant layout ?

- (A) Product layout
- (B) Process layout
- (C) Group layout
- (D) Jumbled layout

62. Johnson's algorithm is used for scheduling of :

- (A)  $n$  jobs 2 machine case
- (B) 2 jobs  $n$  machine case
- (C)  $n$  jobs 3 machine case
- (D) 3 jobs  $n$  machine case

63. CPM was first used in the company :

- (A) ONGC
- (B) NTPC
- (C) NASA
- (D) E I Dupont & Company

64. Slack is the difference between :
- (A) Earliest and latest event time
  - (B) Earliest and latest activity time
  - (C) Longest and shortest activity time
  - (D) None of the above
65. Dummy activity requires :
- (A) Only resource but no time
  - (B) Only time but no resource
  - (C) Both resource and time
  - (D) Neither resource nor time
66. Warehouse is used to store :
- (A) Raw material
  - (B) Work-in-progress
  - (C) Finished goods
  - (D) Tools
67. A solid shaft can resist a bending moment of 3 kNm and a twisting moment of 4 kNm together, then max torque in kNm that can be applied is :
- (A) 7.0
  - (B) 3.5
  - (C) 4.5
  - (D) 5.0

68. Which theory of failure will you use for aluminium components under steady loading is :

- (A) Principal stress theory                      (B) Principal strain theory  
(C) Strain energy theory                      (D) Maximum shear stress theory

69. A thin spherical pressure vessel of 200 mm diameter and 1 mm thickness is subjected to an internal pressure varying from 4 to 8 MPa. Assume that the yield, ultimate and endurance strength of material are 600, 800 and 400 MPa respectively. The factor of safety as per Goodman's relation is :

- (A) 2.0                                              (B) 1.6  
(C) 1.4                                              (D) 1.2

70. If  $P$  is the gauge pressure within a spherical droplet, then gauge pressure within a bubble of the same fluid and of same size will be :

- (A)  $P/4$                                               (B)  $P/2$   
(C)  $P$                                               (D)  $2P$

71. A condenser of a refrigeration system rejects heat at a rate of 120 kW while its compressor consumes a power of 30 kW. The coefficient of performance of the system would be :
- (A)  $1/4$  (B) 4  
(C)  $1/3$  (D) 3
72. 1 kg of water at room temperature is brought into contact with a high temperature thermal reservoir. The entropy change of the universe is :
- (A) Equal to entropy change of the reservoir  
(B) Equal to entropy change of water  
(C) Equal to zero  
(D) Always positive
73. A mould has downsprue whose length is 20 cm and the cross-sectional area at the base of the downsprue is  $1 \text{ cm}^2$ . The downsprue feeds a horizontal runner leading into the mould cavity of volume  $1000 \text{ cm}^3$ . The time required to fill the mould cavity will be :
- (A) 4.05 s (B) 5.05 s  
(C) 6.05 s (D) 7.25 s

74. The true sliding strain for a low carbon steel bar which is doubled in length by forging is :
- (A) 0.307 (B) 0.5  
(C) 0.693 (D) 1.0
75. Misrun is a casting defect which occurs due to :
- (A) very high pouring temperature of the metal  
(B) insufficient fluidity of the molten metal  
(C) absorption of gases by the liquid metal  
(D) improper alignment of the mould flasks
76. The percentage of carbon in gray cast iron is in the range of :
- (A) 0.25 to 0.75 percent (B) 1.25 to 1.75 percent  
(C) 3 to 4 percent (D) 8 to 10 percent
77. In terms of Poisson's ratio ( $\nu$ ) the ratio of Young's Modulus (E) to Shear Modulus (G) of elastic materials is :
- (A)  $2(1 + \nu)$  (B)  $2(1 - \nu)$   
(C)  $\frac{1}{2}(1 + \nu)$  (D)  $\frac{1}{2}(1 - \nu)$

78. The mechanism of material removal in EDM process is :
- (A) Melting and Evaporation                      (B) Melting and Corrosion  
 (C) Erosion and Cavitation                      (D) Cavitation and Evaporation
79. When the temperature of a solid metal increases :
- (A) strength of the metal decreases but ductility increases  
 (B) both strength and ductility of the metal decreases  
 (C) both strength and ductility of the metal increases  
 (D) strength of the metal increases but ductility decreases
80. Arrange the processes in the increasing order of their maximum material removal rate :
- Electrochemical Machining (ECM)  
 Ultrasonic Machining (USM)  
 Electron Beam Machining (EBM)  
 Laser Beam Machining (LBM) and  
 Electric Discharge Machining (EDM)
- (A) USM, LBM, EBM, EDM, ECM (B) EBM, LBM, USM, ECM, EDM  
 (C) LBM, EBM, USM, ECM, EDM (D) LBM, EBM, USM, EDM, ECM

81. Which of the following is a tributary of the Ravi river ?
- (A) Miyar Nallah (B) Saicher  
(C) Spin (D) Budhil
82. In which district of H.P. is Suraj Tal lake ?
- (A) Kullu (B) Lahul-Spiti  
(C) Shimla (D) Chamba
83. According to 2011 census the density of population in four districts of the state is lower than the state average. Three of them are Lahul-Spiti, Kinnaur and Chamba. Which is the fourth ?
- (A) Sirmaur (B) Shimla  
(C) Kullu (D) Solan
84. In which district of H.P. is Col. Sher Jung National Park ?
- (A) Kullu (B) Sirmaur  
(C) Kangra (D) Hamirpur

85. On which of the following occasions women are allowed free travel in H.R.T.C. intra-state buses in Himachal Pradesh ?
- (A) Bhai Dooj (B) Karwa chauth  
(C) Rakshabandhan (D) All of these
86. Which of the following cantonment provided safety to the panic stricken Britisher during the 1857 uprising ?
- (A) Dagshai (B) Sabathu  
(C) Kasauli (D) All of these
87. Which of the following is known for its golf course ?
- (A) Narkanda (B) Naldera  
(C) Mashobra (D) Kufri
88. In which district of H.P. is Kalatope, a place of tourist interest ?
- (A) Kullu (B) Lahul-Spiti  
(C) Chamba (D) Shimla

89. To which village of Kangra District did Justice Mehar Chand Mahajan belong ?
- (A) Nagrota-Bagwan (B) Nagrota Surian  
(C) Khera (D) Tikka Nagrota
90. Who rented out a hut to Sardar Shobha Singh at Andretta, in Kangra district of H.P. ?
- (A) Norab Richards (B) Nicholas Roerich  
(C) Amrita Shergill (D) None of these
91. With which game is Ritu Rani associated ?
- (A) Cricket (B) Hockey  
(C) Archery (D) Shooting
92. Around which date did the Amarnath Shrine Yatra begin in 2016 ?
- (A) June 21 (B) June 25  
(C) July 2 (D) July 8

93. Which city is called Diamond City in India ?

(A) Surat (Gujarat)

(B) Madurai (Tamil Nadu)

(C) Panna (M.P.)

(D) Mysore (Karnataka)

94. When did Puducheri become a union territory ?

(A) 1957

(B) 1963

(C) 1967

(D) 1971

95. Which is the smallest state in India (in area) ?

(A) Sikkim

(B) Goa

(C) Kerala

(D) Mizoram

96. In which country is Rio de Janeiro which is the venue of 2016 Olympics ?

(A) Mexico

(B) Brazil

(C) Columbia

(D) Argentina

97. What is the name of solar powered space craft which entered the Jupiter's orbit after a Journey of nearly five years from the earth ?
- (A) Uno (B) Juno  
(C) Nono (D) Mono
98. With which of the following activities was Abdul Sattar Edhi (of Pakistan) associated ?
- (A) Terrorism (B) Philanthropy  
(C) Sustainable development (D) Climate change/ecology
99. Which day is observed as International Day of the Girl Child ?
- (A) October 01 (B) October 11  
(C) September 01 (D) September 11
100. Which of the following countries is *not* a member of the United Nations (UNO) ?
- (A) Nicosia (B) Macedonia  
(C) Tonga (D) Turkish Cyprus