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PHD-EE-2013

SUBJECT : Mechanical Engineering

B

10002

Sr. No. ....

Time : 1¼ Hours   Max. Marks : 100   Total Questions : 100

Candidate's Name _____ Date of Birth _____

Father's Name _____ Mother's Name _____

Roll No. (in figures) _____ (in words) _____

Date of Examination _____

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(Signature of the Candidate)   (Signature of the Invigilator)

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2. All the candidates *must return* the question booklet as well as OMR Answer-Sheet to the invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.

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1. "Job satisfaction forms the parts of higher level needs." This statement relates to :
   (1) Hygiene Theory
   (2) Theory X
   (3) Theory Y
   (4) Need-Hierarchy Theory

2. The JIT system is also known as :
   (1) Stockless system
   (2) Zero-inventory system
   (3) Lean system
   (4) All of the above

3. The famous book "World Class Manufacturing" was written by :
   (1) Schonharger
   (2) Deming
   (3) Juran
   (4) Crosby

4. FIFO method is used :
   (1) to find inflation
   (2) for stock valuation
   (3) to improve product quality
   (4) to manage project

5. Kanban cards finds use is :
   (1) MRP
   (2) MRP II
   (3) ERP
   (4) JIT

6. "Loss of Goodwill" of customer is connected with :
   (1) Ordering cost
   (2) Carrying cost
   (3) Stock-out cost
   (4) Inventory cost

7. "Quality Loss Function" (QLF) concept was evolved by :
   (1) Juran
   (2) Taguchi
   (3) Womack
   (4) Deming

8. Allowances are expressed in terms of percentage of :
   (1) Standard time
   (2) Normal time
   (3) Observed time
   (4) Performance rating factor

9. Gilbreth evolved therbligs. It consist of :
   (1) 15 basic hand motions
   (2) 16 basic hand motions
   (3) 17 basic hand motions
   (4) 20 basic hand motions

10. Which of the following material flow pattern is most preferred ?

    (1) I–Flow   (2) U–Flow   (3) S–Flow   (4) L–Flow

11. Which motivation theory is regarded as simplified version of Maslow's theory ?

    (1) Theory X   (2) Theory Y

    (3) Hygiene theory   (4) Expentancy theory

12. Activities on the critical path have :

    (1) Zero slack   (2) Minimum slack

    (3) Maximum slack   (4) Negative slack

13. The most commonly used value of smoothing constant is :

    (1) 0   (2) 1   (3) 0.5   (4) 0.1 – 0.2

14. Which of the following forecasting method is also called "Adaptive Forecasting" ?

    (1) Casual Method

    (2) Delphi Method

    (3) Moving Average Method

    (4) Exponential Smoothing Method

15. The Deming Wheel is related to :

    (1) Quality Circle   (2) Inventory Management

    (3) Continuous Improvement   (4) Bench Marking

16. "80% of activity is caused by 20% of the factors." This important management principle finds application in :

    (1) Scatter diagram   (2) Cause and effect diagram

    (3) Bar chart   (4) Pareto chart

17. Malcolm Baldrige Award is related to :

    (1) Science   (2) Sports

    (3) Quality Improvement   (4) Literature

18. Concurrent Engineering is related to used the benefits of :

    (a) CAE   (b) CAD   (c) CAM   (d) FMS

    (1) (a) alone   (2) (a) and (b)

    (3) (b) and (c)   (4) (b), (c) and (d)

19. Paperless trading is related to :

    (1) FMS   (2) EDI   (3) CAD   (4) CAM

20. Lean production is related to :

    (1) Mass production   (2) Batch production

    (3) Stock-driven production   (4) Customized production

21. With a solidification factor of 0.97×10^6 s/m², the solidification time (in second) for a spherical casting of 200 mm diameter is :

    (1) 539   (2) 1078   (3) 4311   (4) 3223

22. The alloying element mainly used to improve the endurance strength of steel material is :

    (1) Nickle   (2) Vanadium   (3) Molybdenum   (4) Tungsten

23. Killed steels :

    (1) have minimum impurity level   (2) are free from O_2

    (3) are produced by ID process   (4) having phosphorus

24. Tin base white metals are used where the bearings are subjected to :

    (1) Large surface wear   (2) Elevated temperature

    (3) High pressure and load   (4) High load

25. Light impurities in molten metal are prevented from reaching the mould cavity by providing a :

    (1) Strainer   (2) Bottom well   (3) Skim bob   (4) All of the above

26. The true strain for low carbon steel bar which is doubled in length by forging is :

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27. The mode of deformation of metal during spinning is :
    (1) Bending
    (2) Streching
    (3) Rolling and stretching
    (4) Bending and stretching

28. The Open Circuit Voltage (OCV) in arc welding ranges from :
    (1) 40 to 80 V
    (2) 100 to 150 V
    (3) 200 to 230 V
    (4) 400 to 440 V

29. Aluminium parts are commonly brazed in :
    (1) Vacuum
    (2) Normal environment
    (3) Oxygen rich-environment
    (4) Nitrogen rich-environment

30. No cutting fluid is normally used while machining :
    (1) Aluminium
    (2) Alloy steel
    (3) Cast iron
    (4) Low carbon steel

31. The recrystallisation temperature is the temperature at which new strain-free grains are formed from the earlier deformed ones. For steel this temperature is close to :
    (1) 350°C
    (2) 560°C
    (3) 800°C
    (4) 1025°C

32. In piercing and blanking operation, the clearance between punch and die solely depends on :
    (1) Diameter of the hole required
    (2) Thickness of the sheet metal
    (3) Number of pieces to be made
    (4) Capacity and type of press

33. For joining of Powder Metallurgy components, the best suited process is :
    (1) Oxy-acetylene welding
    (2) Arc welding
    (3) Electric resistance welding
    (4) Thermit welding

34. A milling cutter having 8 teeth in rotating at 150 r.p.m. If the feed per tooth is 0.1, the value of the table speed in mm/min is :
    (1) 120
    (2) 187
    (3) 23
    (4) 70

35. Helix angle of a fast helix drill is normally :

(1) 35°   (2) 60°   (3) 90°   (4) 5°

36. In the grinding wheel of A60G7B23, B-stands for :

(1) Resinoid bond   (2) Rubber bond

(3) Silicate bond   (4) Shellac bond

37. Holes in Nylon buttons are made by :

(1) EDM   (2) CHM   (3) USM   (4) LBM

38. The simultaneous compacting and sintering is achieved by which method ?

(1) Cold isostatic pressing   (2) Hot isostatic pressing

(3) P/M forging   (4) None of the above

39. The bottles from thermo-plastic materials are made by :

(1) Compression Moulding   (2) Extrusion

(3) Injection Moulding   (4) Blow Moulding

40. In a CNC machine tool, encoder is used to sense and control :

(1) Table position   (2) Table velocity

(3) Spindle speed   (4) Coolant flow

41. Which of the following is *not* part of cam drive unit ?

(1) Cam drive (2) Divider wheel (3) Drive shaft (4) Ratchet drive

42. How many parts can be assembled on multi-station machines ?

(1) More than 3   (2) 2

(3) Less than 3   (4) None of the above

43. Which of the following is *not* a type of encoders ?

(1) Optical (2) Absolute (3) Incremental (4) Logarithmic

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44. A system using an automated work cell controlled by electric signals from a common centralized computer facility is called :

(1) Adaptive control system

(2) Robotics system

(3) Flexible Manufacturing System (FMS)

(4) Automatic guided vehicle system

45. CAD/CAM is the relationship between :

(1) Science and Engineering
(2) Manufacturing and Marketing

(3) Design and Manufacturing
(4) Design and Marketing

46. The final stage in the implementation of CAD in a CAD/CAM system is :

(1) Geometric modelling
(2) Drafting and detailing

(3) Documentation
(4) Design analysis

47. Which of the following devices do *not* produce a hard copy ?

(1) Impact Printers
(2) Plotters

(3) CRT-terminals
(4) Non-impact printers

48. The software that performs the data entry, design, analysis, drafting and manufacturing functions is known as :

(1) Operating software
(2) Graphics software

(3) Application software
(4) Programming software

49. The interaction of user and computer for generating figures is called :

(1) ICG
(2) Computer graphics

(3) CAD
(4) CAPP

50. Which of the following is *not* a operating system software ?

(1) Window
(2) UNIX
(3) VAX/VMS
(4) IDEAS

51. Which type of joints are there in an articulated robot ?

(1) Revolute only   (2) Prismatic only

(3) Both of the above   (4) None of the above

52. Cartesian configuration is also called :

(1) Rectilinear   (2) Cylindrical   (3) Spherical   (4) Articulated

53. Laws of robotic are defined by :

(1) Isaac Newton   (2) Isaac Asimov   (3) Einstein   (4) R. L. Virdi

54. The number of D – H parameters is :

(1) 5   (2) 3   (3) 2   (4) 4

55. The ability of robot to go to a specified position without making a error is called :

(1) Repeatability   (2) Accuracy   (3) Load capacity   (4) None of the above

56. The tool which can be used as end effector is :

(1) Vacuum cup   (2) Grinding wheel

(3) Magnetic gripper   (4) Pressure gripper

57. The size of robot workspace depends upon :

(1) Robot geometry   (2) Degree of freedom

(3) None of the above   (4) Both of the above

58. "Automatic placement and withdrawal of parts and products into and from designated places in a warehouse" describes :

(1) AGV   (2) CAD/CAM   (3) CIM   (4) ASRS

59. "Operators simply load new programs, as necessary, to produced different products" describes :

(1) Automated guided vehicle   (2) Flexible Manufacturing System

(3) Vision system   (4) Process control

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60. Which type of material is useful for tactile sensors ?

(1) Magnetic Material

(2) Plastic Material

(3) Glass

(4) Pizeoelectic Material

61. The minimum number of safety valves fitted with every boiler is :

(1) 1

(2) 2

(3) 3

(4) 4

62. Without compounding, impulse steam turbine rotor can achieve a speed of :

(1) 1000 rpm

(2) 5000 rpm

(3) 10,000 rpm

(4) 30,000 rpm

63. Nuclear gas turbine is classified as :

(1) Constant volume closed gas turbine

(2) Constant pressure open gas turbine

(3) Constant volume open cycle gas turbine

(4) Constant pressure closed cycle gas turbine

64. The average number of fast Neutrons produced in a fission of an U − 235 atom is nearly equal to :

(1) 1.23

(2) 2.46

(3) 3.69

(4) 4.92

65. Fast breeder reactor uses the following moderator :

(1) Graphite

(2) Heavy water

(3) No-moderator

(4) Ordinary water

66. Symmetrical blading is used in a turbine when its degree of reaction is :

(1) 25%

(2) 50%

(3) 75%

(4) 100%

67. Benson boiler is one of the high pressure boilers having :

(1) one drum

(2) one water drum and one steam drum

(3) three drum

(4) no drum

68. An increase in fin effectiveness is caused by high value of :

(1) Convective Coefficient

(2) Thermal Conductivity

(3) Sectional Area

(4) Circumference

69. Heat transfer by radiation is encountered least in :

    (1) Boiler furnace

    (2) Insulated steam pipe

    (3) Electric bulb

    (4) Nuclear reactor

70. Dropwise condensation usually occurs on :

    (1) Galzed surface

    (2) Smooth surface

    (3) Oily surface

    (4) Coated surface

71. The SI unit of overall heat transfer coefficient is :

    (1) $W/m - K$

    (2) $W/m^2 - K^2$

    (3) $W/m^2 - K$

    (4) $W/m - K^2$

72. In which cycle, heat addition and heat rejection both take places at constant pressure ?

    (1) Diesel Cycle

    (2) Otto Cycle

    (3) Brayton Cycle

    (4) Dual Cycle

73. Choose the *correct* relationship :

    (1) $F = U - TS$

    (2) $G = H - TS$

    (3) $TdS = dU - pdV$

    (4) $TdS = dH - Vdp$

74. Which of the following conditions is *true* for an opaque body ?

    (1) $\tau + \alpha - \gamma = 1$

    (2) $\tau = 0, \alpha + \gamma = 1$

    (3) $\alpha = 0, \tau + \gamma = 1$

    (4) $\tau = 0, \gamma = 0, \alpha = 1$

75. Feed pump work in Rankine Cycle is an example of :

    (1) Adiabatic Expansion

    (2) Adiabatic Compression

    (3) Isobaric Compression

    (4) Isobaric Expansion

77. One torr pressure is equivalent to :

    (1) 1 atmosphere   (2) 1 Pascal   (3) 10 m of water   (4) 1 mm of mercury

78. Surge and chocking are encountered in :

    (1) Centrifugal compressors

    (2) Axial flow compressors

    (3) Centrifugal and Axial flow compressor both

    (4) Reciprocating compressor

79. A single stage centrifugal compressor can produce a pressure ratio of :

    (1) 2   (2) 3   (3) 4   (4) 10

80. 1 ton of refrigeration is equal to :

    (1) 2.0 kW   (2) 2.5 kW   (3) 3.5 kW   (4) 4.5 kW

81. If P is the pitch of square thread, then the depth of the thread d is given by :

    (1) 0.5 P   (2) P   (3) 1.5 P   (4) 2.0 P

82. In a fillet welded joint, the weakest area of the weld is :

    (1) Toe   (2) Root   (3) Throat   (4) Face

83. A wire rope is designated as 6×19 standard hoisting. The number 6×19 represents

    (1) diameter in mm and length in meter

    (2) diameter in cm and length in meter

    (3) number of strands and number of wires in each strand

    (4) number of wires in each strand and number of strands

84. To ensure self locking in a screw jack, it is essential that helix angle is :

    (1) Larger than friction angle

    (2) Smaller than friction angle

    (3) Equal to friction angle

    (4)

85. When a shaft transmits power through gears, the shaft experiences :

    (1) torsional stresses only

    (2) bending stresses only

    (3) constant bending and varying torsional stresses

    (4) varying bending and constant torsional stresses

86. In a 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 constant surfaces will be equal to :

    (1) 11   (2) 12   (3) 10   (4) 22

87. The life of a ball-bearing at a load of 10 KN is 8000 hr's. Its life in hour's, if the load is increased to 20 KN, keeping all other conditions same as :

    (1) 4000   (2) 2000   (3) 1000   (4) 500

88. A riveted joint has a tearing efficiency of 50 percent corresponding to that, the ratio of pitch to the diameter of rivet equals :

    (1) 1.0   (2) 1.5   (3) 2.0   (4) 3.0

89. The edges of boiler plates are bevelled to an angle of :

    (1) 30°   (2) 45°   (3) 60°   (4) 80°

90. The variation of hoop stresses across the thickness of a thick cylinder is :

    (1) Linear   (2) Uniform   (3) Parabolic   (4) Hyperbolic

91. A specimen is stressed slightly beyond the yield point and then unloaded. Its yield strength will :

    (1) decrease   (2) increase

    (3) remain same   (4) become equal to ultimate tensile strength

92. Which theory of failure will be used for aluminium components under steady loading ?

    (1) Principal stress theory   (2) Principal strain theory

    (3) Strain energy theory   (4) Maximum shear stress theory

93. Which of the following method is *not* used for increasing the fatigue strength of a welded joint ?

(1) Hammar peening

(2) Heat treatment

(3) Coating

(4) Grinding

94. Effective stress in wire ropes during normal working is equal to the stress due to :

(1) axial load plus stress due to bending

(2) axial load plus stress due to acceleration

(3) bending plus stress due to acceleration

(4) acceleration of masses plus stress due to bending

95. Which of the following belts should *not* be used above 40 degree celsius ?

(1) Balata belt (2) Rubber belt (3) Synthetic belt (4) Febric belt

96. A key connecting a flange coupling to a shaft is likely to fail in :

(1) Shear (2) Tension (3) Torsion (4) Bending

97. In Lever of class three, the mechanical advantage is always :

(1) Equal to one

(2) Less than one

(3) More than one

(4) More than two

98. In spur gear having involute teeth, the product of circular pitch and diametral pitch is :

(1) 3.14 (2) 6.28 (3) 1.57 (4) 9.42

99. A spring of stiffness 1000 N/m is stretched initially by 10 cm from the undeformed position. The work required to stretch it another 10 cm is :

(1) 5 N – m (2) 7 N – m (3) 10 N – m (4) 15 N – m

100. Two shafts A and B are made of the same material. The diameter of shaft B is twice that of shaft A. The ratio of power which can be transmitted by shaft A to that of B is :

(1) $\dfrac{1}{2}$ (2) $\dfrac{1}{4}$ (3) $\dfrac{1}{8}$ (4) $\dfrac{1}{16}$