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PHD-EE-2013

SUBJECT : Mechanical Engineering

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10025

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 _____

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

SEAL

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. *All questions are compulsory and carry equal marks.*

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.

3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing **within two hours** after the test is over. No such complaint(s) will be entertained thereafter.

4. The candidate **must not** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers **Should Not** be ticked in the question booklet.

5. *Use black or blue ball point pen only in the OMR Answer-Sheet.*

6. For each correct answer, the candidate will get full credit. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer. There will be No Negative marking.

7. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

1. 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

2. 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

3. 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

4. A milling cutter having 8 teeth in rotating at 150 r.p.m. If the feed per tooth is 0.1 mm, the value of the table speed in mm/min is :

   (1) 120   (2) 187   (3) 125   (4) 70

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

   (1) 35°   (2) 60°   (3) 90°   (4) 5°

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

   (1) Resinoid bond   (2) Rubber bond

   (3) Silicate bond   (4) Shellac bond

7. Holes in Nylon buttons are made by :

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

8. 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

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

   (1) Compression Moulding   (2) Extrusion

   (3) Injection Moulding   (4) Blow Moulding

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

    (1) Table position   (2) Table velocity

    (3) Spindle speed   (4) Coolant flow

11. With a solidification factor of 0.97×10^6 s/m^2, the solidification time (in second) for a spherical casting of 200 mm diameter is :

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

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

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

13. Killed steels :

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

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

14. 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

15. 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

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

    (1) 0.307   (2) 0.5   (3) 0.693   (4) 1.0

17. The mode of deformation of metal during spinning is :

    (1) Bending   (2) Streching

    (3) Rolling and stretching   (4) Bending and stretching

18. 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

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

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

21. Which motivation theory is regarded as simplified version of Maslow's theory ?
    (1) Theory X   (2) Theory Y
    (3) Hygiene theory   (4) Expentancy theory

22. Activities on the critical path have :
    (1) Zero slack   (2) Minimum slack
    (3) Maximum slack   (4) Negative slack

23. The most commonly used value of smoothing constant is :
    (1) 0   (2) 1   (3) 0.5   (4) 0.1 – 0.2

24. 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

25. The Deming Wheel is related to :
    (1) Quality Circle   (2) Inventory Management
    (3) Continuous Improvement   (4) Bench Marking

26.   of quality is caused by 20% of the causes. This important management
    principle finds application in :
    (1) Pareto diagram   (2) Cause and effect diagram
                                        (4)

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27. Malcolm Baldrige Award is related to :

    (1) Science   (2) Sports

    (3) Quality Improvement   (4) Literature

28. 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)

29. Paperless trading is related to :

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

30. Lean production is related to :

    (1) Mass production   (2) Batch production

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

31. "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

32. The JIT system is also known as :

    (1) Stockless system   (2) Zero-inventory system

    (3) Lean system   (4) All of the above

33. The famous book "World Class Manufacturing" was written by :

    (1) Schonharger   (2) Deming

    (3) Juran   (4) Crosby

34. FIFO method is used :

    (1) to find inflation   (2) for stock valuation

35. Kanban cards finds use is :

    (1) MRP   (2) MRP II   (3) ERP   (4) JIT

36. 'Loss of Goodwill' of customer is connected with :

    (1) Ordering cost   (2) Carrying cost   (3) Stock-out cost   (4) Inventory cost

37. "Quality Loss Function" (QLF) concept was evolved by :

    (1) Juran   (2) Taguchi   (3) Womack   (4) Deming

38. Allowances are expressed in terms of percentage of :

    (1) Standard time   (2) Normal time

    (3) Observed time   (4) Performance rating factor

39. 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

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

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

41. 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

42. 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

43. 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

44. 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

45. 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

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

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

47. 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

48. 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

49. 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

50. 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) $\dfrac{1}{16}$

51. 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

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

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

53. 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

54. 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) Such as to give maximum efficiency in lifting

55. 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

56. 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

57. 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

58. 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

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

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

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

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

61. 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) $W/m-K^2$

62. 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

63. Choose the *correct* relationship :

(1) $F = U - TS$　　　　　　　　(2) $G = H - TS$

(3) $TdS = dU - pdV$　　　　　　(4) $TdS = dH - Vdp$

64. 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) $\tau = 0, \gamma = 0, \alpha = 1$

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

(1) Adiabatic Expansion　　　　(2) Adiabatic Compression

(3) Isobaric Compression　　　　(4) Isobaric Expansion

66. A velocity potential function exists only for :

(1) Uniform flow　　　　　　(2) Compressible flow

(3) Steady flow　　　　　　　(4) Irrotational flow

67. One torr pressure is equivalent to :

(1) 1 atmosphere　　　　　　(2) 1 Pascal

(3) 10 m of water　　　　　　(4) 1 mm of mercury

68. Surge and chocking are encountered in :
    (1) Centrifugal compressors
    (2) Axial flow compressors
    (3) Centrifugal and Axial flow compressor both
    (4) Reciprocating compressor

69. A single stage centrifugal compressor can produce a pressure ratio of :
    (1) 2   (2) 3   (3) 4   (4) 10

70. 1 ton of refrigeration is equal to :
    (1) 2.0 kW   (2) 2.5 kW   (3) 3.5 kW   (4) 4.5 kW

71. The minimum number of safety valves fitted with every boiler is :
    (1) 1   (2) 2   (3) 3   (4) 4

72. 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

73. 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

74. 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

75. Fast breeder reactor uses the following moderator :
    (1) Graphite   (2) Heavy water   (3) ...   (4) ...

77. 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

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

    (1) Convective Coefficient   (2) Thermal Conductivity

    (3) Sectional Area   (4) Circumference

79. Heat transfer by radiation is encountered least in :

    (1) Boiler furnace   (2) Insulated steam pipe

    (3) Electric bulb   (4) Nuclear reactor

80. Dropwise condensation usually occurs on :

    (1) Galzed surface   (2) Smooth surface

    (3) Oily surface   (4) Coated surface

81. 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

82. Cartesian configuration is also called :

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

83. Laws of robotic are defined by :

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

84. The number of D – H parameters is :

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

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

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

    (1) Vacuum cup
    (2) Grinding wheel
    (3) Magnetic gripper
    (4) Pressure gripper

87. The size of robot workspace depends upon :

    (1) Robot geometry
    (2) Degree of freedom
    (3) None of the above
    (4) Both of the above

88. "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

89. "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

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

    (1) Magnetic Material
    (2) Plastic Material
    (3) Glass
    (4) Pizeoelectic Material

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

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

92. 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

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

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

94. 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

95. CAD/CAM is the relationship between :

(1) Science and Engineering

(2) Manufacturing and Marketing

(3) Design and Manufacturing

(4) Design and Marketing

96. 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

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

(1) Impact Printers

(2) Plotters

(3) CRT-terminals

(4) Non-impact printers

98. 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

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

(1) ICG

(2) Computer graphics

(3) CAD

(4) CAPP

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

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