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ENTRANCE EXAMINATION – JULY 2016

QUESTION PAPER

PROGRAMME : Ph. D

MECHANICAL ENGINEERING

Time : 2 hours **Marks: 100**

INSTRUCTION TO THE CANDIDATES

1. Use only Pencil to indicate your answers. Use Ball-Point only for writing Name, Register Number and Signature.
2. Darken the square completely. Mark your answers like this [1] [2] [3] [4]
3. Part A is common to all.

Name of the Student: ..... Programme Applied:	Register Number Exam Centre Seal
Signature of the Student	Signature of the Invigilator

NIUEE 2016

Part A

1. The development of a solid foundation of reliable knowledge typically is built from which type of research?
   a. basic research b. action research
   c. evaluation research d. orientational research

2. The idea that when selecting between two different theories with equal explanatory value, one should select the theory that is the most simple, concise, and succinct is known as _____.
   a. criterion of falsifiability b. critical theory
   c. guide of simplicity d. rule of parsimony

3. Research that is done to examine the findings of someone else using the "same variables but different people" is which of the following?
   a. exploration b. Hypothesis c. Replication d. empiricism

4. A researcher designs an experiment to test how variables interact to influence how well children learn spelling words. In this case, the main purpose of the study was:
   a. Explanation b. Description c. Influence d. Prediction

5. What is the key defining characteristic of experimental research?
   a. extraneous variables are never present
   b. a positive correlation usually exists
   c. a negative correlation usually exists
   d. manipulation of the independent variable

6. Which of the following includes examples of quantitative variables?
   a. age, temperature, income, height
   b. grade point average, anxiety level, reading performance
   c. gender, religion, ethnic group
   d. both a and b

7. One step that is not included in planning a research study is:
   a. Identifying a researchable problem b. A review of current research
   c. Statement of the research question d. Developing a research plan

8. Sources of researchable problems can include:
   a. Researchers' own experiences as educators
   b. Practical issues that require solutions
   c. Theory and past research
   d. All of the above

9. The feasibility of a research study should be considered in light of:
   a. Cost and time required to conduct the study
   b. Skills required of the researcher
   c. Potential ethical concerns
   d. All of the above

10. A formal statement of the research question or "purpose of research study" generally _____.
    a. Is made prior to the literature review b. Is made after the literature review
    c. Will help guide the research process d. b and c

11. Which term refers to publishing several articles from the data collected in one large study?
    a. Duplicate publication b. Partial publication
    c. Triplicate publication d. None of these

12. Which of the following is a right of each participant according to the AERA?
    a. Deception b. Utilitarianism
    c. Freedom to withdraw d. Participants have no rights

13. Which of the following is a type of criterion–related validity evidence?
    a. Concurrent evidence b. Predictive evidence
    c. Internal consistency d. Both a and b are correct answers

14. Which of the following is not a type of reliability?
    a. Test-retest b. Split-half c. Content d. Internal consistency

15. Which of the following types of reliability refers to the consistency of test scores over time?
    a. Equivalent forms reliability b. Split-half reliability
    c. Test-retest reliability d. Inter-scorer reliability

16. Which type of reliability refers to the consistency of a group of individuals' scores on two equivalent forms of a test designed to measure the same characteristic?
    a. Split-half b. Test-retest c. Split-forms d. Equivalent forms

17. _____ refers to how well the particular sample of behaviors used to measure a characteristic reflects the entire domain of behaviors that constitutes that characteristic.
    a. Construct validity evidence b. Criterion-related validity evidence
    c. Content validity evidence d. Face validity evidence

18. Which of these is not a method of data collection.
    a. Questionnaires b. Interviews c. Experiments d. Observations

19. Another name for a Likert Scale is a(n):
    a. Interview protocol b. Event sampling
    c. Summated rating scale d. Ranking

20. A question during an interview such as "Why do you feel that way?" is known as a:
    a. Probe b. Filter question c. Response d. Pilot

21. A census taker often collects data through which of the following?
    a. Standardized tests b. Interviews
    c. Secondary data d. Observations

22. In which of the following nonrandom sampling techniques does the researcher ask the research participants to identify other potential research participants?
    a. Snowball b. Convenience c. Purposive d. Quota

23. Which of the following is the most efficient random sampling technique?
    a. Simple random sampling b. Proportional stratified sampling
    c. Cluster random sampling d. Systematic sampling

24. Which of the following would usually require the smallest sample size because of its efficiency?
    a. One stage cluster sampling b. Simple random sampling
    c. Two stage cluster sampling d. Quota sampling

25. _____ is a set of elements taken from a larger population according to certain rules.
    a. Sample b. Population c. Statistic d. Element

Part B

26. The ability of a material to sustain loads without failure is known as
    a. Mechanical strength b. stiffness
    c. toughness d. Ductility

27. Silicon carbide is
    a. Natural abrasive b. synthetic abrasive
    c. artificial abrasive. d. none of the above

28. Which of the followings are heat treatment processes?
    a. Normalizing b. annealing c. tempering d. all of the above

29. Eutectoid steel is a steel containing carbon
    a. Less than 0.8% b. equal to 0.8%
    c. from 0.8% to 2.0% d. 0%

30. Iron carbon equilibrium diagram
    a. is constructed by plotting temperature along y – axis and carbon percentage along x - axis
    b. establishes a correlation between the microstructure and properties of steel and cast iron
    c. indicates the phase changes that occur during heating and cooling
    d. all of the above

31. A test used to determine yield strength, modulus of elasticity, % elongation and % reduction in area, is known as
    a. hardness test b. Impact test c. tensile test d. fatigue test

32. Which of the following processes are used in case hardening
    a. carburizing b. nitriding c. oxide coating d. only (a) and (b)

33. The process of introducing carbon into low carbon steels in order to produce a hard surface is known as
    a. catrbonitriding b. induction hardening
    c. carburizing d. cyaniding

34. Type of fracture for cast iron under high compressive load will be
    a. brittle b. semi brittle c. ductile d. creep

35. The property of material by which it can be rolled into sheets is called
    a. plasticity b. elasticity c. malleability d. ductility

36. Cold work is done on metals
    a. below thermal critical range b. at temperature below zero degree centigrade
    c. above thermal critical range d. after slightly warming up the metal in furnace

37. The charpy test is conducted measure
    a. elongation b. hardness c. brittleness d. fracture stress

38. Hardness is
    a. resistance to sliding b. resistance to deformation
    c. resistance to scratching d. resistance to machining

39. In iron – iron carbide diagram the abscissae is
    a. time b. temperature c.carbon percentage d. iron percentage

40. Which of the following will have least percentage of carbon?
    a. high ductility wires b. connecting rods
    c. dies and punches d. paper knives

41. Which one of the following is closest to the purest from or iron?
    a. mild steel b. grey cast iron c. modular cast iron d. wrought iron

42. The concentration of plastic deformation in a localized region of a sample under tension is called
    a. necking b. branching c. strengthening d. redistribution

43. Which of the following material will follow Hooke's law most closely?
    a. Mild Steel b. Carbon steel
    c. Cemented tungsten carbide d. Soft rubber

44. To increase the corrosion resistance of steel
    a. vanadium is added as an alloying element
    b. chromium is added as an alloying element
    c. nickel is added as an alloying element
    d. copper is added as an alloying element

45. A test used to determine endurance strength and endurance limit for a metal, is known as
    a. hardness test b. impact test c. tensile test d. fatigue test

46. The carbon content in cast iron is
a. above 2% b. up to 2% c. below 0.8% d. above 6.3%

47. The carbon content in steel is
a. above 2% b. up to 2% c. below 0.8% d. above 6.3%

48. The upper critical temperature for a steel
a. is constant b. Depends upon the rate of heating
c. varies according to the carbon content in steel d. none of the above

49. The property of a material to resist penetration by another material is known as
a. Toughness b. hardness c. stiffness d. resilience

50. Which of the followings are the cast non - ferrous materials?
a. Cobalt b. stellite c. tantung d. all of the above

51. Process of pouring molten metal into mould and allowed to solidify, when the mould is revolving is known as
a. Permanent mould casting b. die casting
c. slush casting d. centrifugal casting

52. Surface finish of casting depends upon
a. Mould dressing b. pattern finish
c. fineness of sand d. all of the above

53. In the foundry sand 'Bentonite' is used as
a. Plasticizer b. surface finish improver c. Binder d. refractory power

54. Casting defect development due to inadequate venting is
a. Inclusions b. blow holes c. cold shuts d. none of the above

55. Jolt machine produce
a. uniform ramming about the pattern b. uniform ramming about the flask
c. uniform distribution throughout d. pack sand loosely all around

56. In hot working process
a. grain structure of the metal is refined
b. porosity of metal is largely eliminated
c. mechanical properties such as ductility, toughness, elongation and reduction in area are improved
d. all of the above

57. Process used for making internal thread is known as
a. Extrusion b. cold peening c. hot piercing d. tapping

58. cam is used to _____ power
a. Create b. transmit c. produce d. develop

59. Which of the following is not a flexible type of connector?
a. Belt b. Rope c. Chain d. Gear

60. Due to slip the velocity ratio of a belt drive
    a. Increases b. Decreases c. Remains same d. None of the above

61. The law of belting states that the centre line of the when it _____a pulley must lie in the mid plane of that pulley.
    a. Leaves b. Approaches
    c. Approaches as well as leaves d. None of the above

62. Ratio between velocity of the driver and follower is called
    a. Pressure ratio b. Slip c. Creep d. Velocity ratio

63. Which of the following is not a belt material?
    a. Nylon b. Steel c. Rubber d. Leather

64. Centrifugal tension in a belt depends on
    a. Velocity of the belt b. Material of the belt
    c. Mass or density of the belt d. None of the above

65. Friction that exists between two lubricated surfaces is known as
    a. Dry friction b. Greasy friction c. Fluid friction d. None of the above

66. The point through which the whole weight of the body acts, irrespective of its position is known as
    a. moment of inertia b. centre of gravity
    c. centre of percussion d. centre of mass

67. Concurrent forces are those whose lines of action
    a. lie on the same plane b. meet at one point
    c. meet on the same plane d. none of these

68. The friction experienced by a body, when in motion is known as
    a. rolling friction b. dynamic friction c. limiting friction d. static friction

69. The rate of doing work is known as
    a. potential energy b. kinetic energy c. power d. kg-m

70. If the velocity in a fluid flow does not change with respect to length of direction of flow, it is called
    a. steady flow b. uniform flow c. incompressible flow d. rotational flow

71. If the fluid particles move in straight lines and all lines are parallel to the surface, the flow is called
    a. steady b. uniform c. compressible d. laminar

72. Pitot tube is used to measure
    a. discharge b. average velocity c. velocity at a point d. pressure at a point

73. A closed system is one, which
    a. permits the passage of energy and matter across the boundaries
    b. does not permit the passage of energy and matter across the boundaries

c. permits the passage of energy across the boundary but does not permit the passage of matter
d. permits the passage of matter across the boundary but does not permit the passage of energy

74. Control volume refers to
    a. a specified mass
    b. a fixed region in the space
    c. a closed system
    d. none of the above

75. Specific heat is the amount of heat required to raise the temperature
    a. by unit degree of a substance
    b. by unit of degree of a unit mass
    c. of a unit mass by 10
    d. none of the above

76. Internal energy of a perfect gas depends upon
    a. temperature only
    b. temperature & pressure
    c. temperature, pressure & specific heats
    d. none of the above

77. For a closed system, difference between the heat added to the system and work done by the gas, is equal to the change in
    a. enthalphy b. entropy c. internal energy d. temperature

78. The sequence of process that eventually returns the working substance to its original state is
    a. event
    b. thermodynamic cycle
    c. thermodynamic property
    d. none of the above

79. When two bodies are in thermal equilibrium with a third body, they are also in thermal equilibrium
    a. zeroth law of thermodynamics
    b. first law of thermodynamics
    c. second law of thermodynamics
    d. none of the above

80. Kelvin-Plank's law deals with
    a. conversion of work into heat
    b. conversion of heat into work
    c. conservation work
    d. conservation of heat

81. The temperature of a gas is a measure of
    a. average distance between gas molecules
    b. average kinetic energy of gas molecules
    c. average potential energy of gas molecules
    d. none of the above

82. The temperature at which, the volume of a gas becomes zero, is known as
    a. absolute temperature
    b. absolute zero temperature
    c. absolute scale of temperature
    d. none of the above

83. Equal volume of all gases, at the same temperature and pressure, contain equal number of molecules. This is according to
    a. Charle's Law b. Avagadro's Law c. Joule's Law d. Gay Lussac Law

84. The universal gas constant of a gas is the product of molecular weight of the gas and
    a. gas constant
    b. specific heat at constant pressure
    c. specific heat at constant volume
    d. none of the above

85. The gas constant (R) is equal to the
    a. sum of two specific heats b. difference of two specific heat
    c. products of two specific heats d. ratio of two specific heats

86. In an isothermal process, internal energy
    a. increases b. remains constant c. decreases d. none of the above

87. A process, in which no heat is supplied or rejected from the system and entropy is not constant, is known as
    a. isothermal b. isentropic c. polytropic d. hyperbolic

88. The Carnot cycle consist of two adiabatic processes and
    a. two isothermal processes b. two constant pressure processes
    c. two constant volume processes d. one constant pressure process.

89. Otto cycle is a theoretical cycle, on which
    a. only petrol engine run b. only diesel engine run
    c. only gas engines run d. petrol and gas engine runs

90. In Carnot cycle, the process carried at extremely slow speed is
    a. isothermal compression b. adiabatic compression
    c. adiabatic expansion d. all of the above

91. Which of the following is not a petroleum product?
    a. petrol b. kerosene c. methylated spirit d. lubricating oil

92. A system is said to be consisting of a pure substance when
    a. it is homogenous in composition
    b. it is homogenous and invariable in chemical aggregation
    c. it has only one phase
    d. it has more than one phase

93. For reversible adiabatic compression in a steady flow process, the work transfer per unit mass is
    a. $\int p\,dV$ b. $\int v\,dP$ c. $\int T\,dS$ d. $\int S\,dT$

94. The cutting edge of the tool is perpendicular to the direction of tool travel in
    a. Orthogonal cutting of metals b. oblique cutting materials
    c. both a. & b above d. none of the above

95. In metal cutting operations continuous chips are
    a. brittle material b. ductile material c. hard material d. soft material

96. Cutting tool used on lathe, shaper and planer is
    a. single point b. two point c. three point d. multi point

97. Velocity of tool along the tool face is known as
    a. cutting velocity b. chip velocity c. shear velocity d. average velocity

98. The depth of cut depends upon
    a. cutting speed
    b. tool material
    c. rigidity of machine tool
    d. all of the above

99. The process of improving cutting action of grinding wheel is called
    a. dressing operation
    b. truing operation
    c. cutting operation
    d. facing operation

100. Basic law of heat conduction is
    a. fourier's law
    b. newton's law
    c. stefan's law
    d. first law of thermodynamics