M/P ENT – 144

Total No. of Pages : 12

Seat No.	

M.Phil/Ph.D. Entrance Examination, October - 2021
MECHANICAL ENGINEERING

Day and Date : Wednesday, 27 - 10 - 2021 **Total Marks : 100**
Time : 04.00 p.m. to 06.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Each question carries 2 marks.**
3) **Answers should be marked in the given OMR answer sheet by darkening the appropriate option.**
4) **Use black ball point pen only for marking the circle. Do not make any stray mark on the OMR Answer Sheet.**
5) **Follow the instructions given on OMR sheet.**
6) **Rough work shall be done on the sheet provided at the end of question paper.**
7) **Only non programmable calculators are allowed.**

1. Analytical research relies on
(A) Facts and concepts
(B) Description of phenomena
(C) Experimental observations
(D) Facts and data

2. Field research consists of
(A) Participant observations
(B) Mass observations
(C) Group interviews
(D) All of above

3. Analyzing responses to statements “I like going to gym every day” and “I go to gym at least 3 times a week” will quality for
(A) Quantitative and Qualitative research respectively
(B) Quantitative and Qualitative research respectively
(C) Qualitative and Quantitative research respectively
(D) Qualitative and Qualitative research respectively

4. Outcome of the literature review

(A) Logical arrangement of ideas/current references

(B) Unbiased view of previous work

(C) Formulation of research objectives

(D) All of above

5. Identify the appropriate case for granting a patent

(A) Discovery of scientific principle

(B) Discovery of new form of known substance

(C) New product involving inventive step and capable of industrial application

(D) New mathematical algorithm

6. Research design is a blue print, outline and a

(A) Guidance (B) Control

(C) Plan (D) Strategy

7. The purpose of an experimental design, as compared to other designs, is a clear intent to

(A) answer the research question

(B) provide highly significant or important results

(C) show cause and effect relationships

(D) provide the most valid type of design

8. True experimental designs are different from quasi-experimental designs in that

(A) quasi-experimental designs include two groups while true experimental designs include more than two groups

(B) true experimental designs include random selection of subjects from a population

(C) quasi-experimental designs are more useful and provide better information in real- life situations

(D) quasi-experimental designs lack random assignment of subjects

9. The characteristic that most clearly distinguishes experimental designs from non-experimental designs is that in experimental designs

(A) there is random selection of subjects

(B) the researcher becomes a participant in the study

(C) the researcher collects data

(D) there is manipulation of those things subjects will experience

10. Increasing the sample size has the following effect upon the sampling error?

(A) It increases the sampling error

(B) It reduces the sampling error

(C) It has no effect on the sampling error

(D) All of the above

11. Which of the following is not a type of non-probability sampling?

(A) Stratified random sampling

(B) Convenience sampling

(C) Quota sampling

(D) Snowball sampling

12. A scale used to indicate the ranking of materials based on their tensile strengths is called as

(A) Nominal scale (B) Ordinal scale

(C) Interval scale (D) Ratio scale

13. Analysis of defective parts manufactured per shift in a manufacturing company will be considered as

(A) Univariate analysis (B) Bi-variate analysis

(C) Multivariate analysis (D) Regression analysis

14. Student's t-distribution is used when

(A) Sample size is less (typically < 30)

(B) Standard deviation of sample is known

(C) Standard deviations of both sample and population is known

(D) Sample size is large but standard deviation of the population is unknown

15. The magnitude of the improvement achieved due to treatment or experiment is well indicated by

(A) value of statistical significance level

(B) value of effect size

(C) value of confidence level

(D) none of the above

16. Which one of the below is not source of error in measurement

(A) Respondent error

(B) Error due to improper data cleaning

(C) Instrumental error

(D) Situational error

17. A null hypothesis can only be rejected at the 5% significance level if and only if:

(A) A 95% confidence interval includes the hypothesized value of the parameter

(B) A 95% confidence interval does not include the hypothesized value of the parameter

(C) The null hypothesis is void

(D) The null hypotheses includes sampling error

18. A type I error occurs when:

(A) The null hypothesis is incorrectly accepted when it is false

(B) The null hypothesis is incorrectly rejected when it is true

(C) The sample mean differs from the population mean

(D) The test is biased

19. Analysis of variance is a statistical method of comparing the _____ of several populations.

(A) Standard deviations

(B) Variances

(C) Means

(D) Proportions

20. The chi-square test can be too sensitive if the sample is:

(A) Very small (B) Very large

(C) Homogeneous (D) Predictable

21. Which of the following is not true about e-journals

(A) They are always free of cost

(B) They are distributed through digital modes

(C) They also have editorial board

(D) They are publications of serial nature

22. Which of the following is an optional supplement of a research paper

(A) Foot Note (B) Glossary

(C) References (D) Appendix

23. A treatise on a single subject is called as

(A) Research report (B) Dissertation

(C) Monograph (D) Book

24. In research methodology, interpretation is search of

(A) Data

(B) Research Problem

(C) Research Plan

(D) Research Findings

25. Thesis is also known as

(A) Dissertation (B) Research Report

(C) Book (D) None of these

26. In spring mass damper system with a time period of 1 sec the amplitude of oscillation decays from 8 mm to 2 mm in 2 complete oscillations. If the initial amplitude is 6 mm what will be the amplitude after 4 second

(A) 1.5 mm (B) 0.375 mm

(C) 3 mm (D) 0.2 mm

27. A damper offers resistance 0.05 N at constant velocity 0.04 m/sec. The damper is used with k=9 N/m. determine damping frequency of the system when mass of the system is 0.10 kg

(A) 3.66 rad/sec
(B) 8.24 rad/sec
(C) 7.14 rad/sec
(D) None of above

28. The progressive deformation of machine component under the load at high temperature is called as

(A) creep
(B) hardness
(C) ductility
(D) thermal expansion

29. The resistance of fatigue of materials is measured by

(A) elastic limit
(B) young's modulus
(C) ultimate tensile strength
(D) endurance limit

30. Formation of mathematical model is a part of

(A) Feasibility Study
(B) Preliminary design
(C) Detailed design
(D) Planning for Manufacturing

31. The material commonly used crane hooks is

(A) cast iron
(B) wrought iron
(C) mild steel
(D) aluminum

32. Steel with 0.8 percent carbon is known as

(A) eutectoid steel
(B) hyper-eutectoid steel
(C) hypo-eutectoid steel
(D) none of these

33. Techniques used to optimize the shape and topology of a structural system is

(A) Discrete and Continuum optimization

(B) Golden Section

(C) Kuhn — Tucker

(D) Continuous optimization

34. The differential form of continuity equation is _____

(A) $\rho/t + \nabla. (\rho V)=0$

(B) $\nabla.u=constant$

(C) $Dv/dt=0$

(D) $\rho=0$

35. The Navier- Stokes equation can be used in which of the following applications?

(A) Automobiles

(B) Ocean currents

(C) Airplanes

(D) Thermometer

36. In a hydrodynamic boundary layer

(A) Tensile stresses influence the velocity distribution

(B) Shear stresses influence the velocity distribution

(C) Compressive stresses influence the velocity distribution

(D) None

37. Momentum equation for hydrodynamic layer is

(A) Firstly $u\partial u/\partial x+v\partial u/\partial y=v\partial^2 u/\partial x^2$

(B) Secondly $u\partial u/\partial x+v\partial u/\partial y=v\partial^2 u/\partial y^2$

(C) Thirdly $u\partial u/\partial x+v\partial u/\partial y=v\partial^2 u/\partial y$

(D) None

38. An Ideal gas as compared to a real gas at very high pressure occupies

(A) more volume

(B) less volume

(C) equal volume

(D) unpredictable behavior

39. The value of a in van der Waal equation is _____ /dependent on ___

(A) pressure

(B) temperature

(C) pressure and temperature

(D) independent of pressure and temperature

40. Twisted tape is used to enhance condensation heat transfer rate inside horizontal tube, most appropriate reason is

(A) it acts as fin

(B) it increases turbulence, hence higher Re number leads to high heat transfer

(C) It breaks viscous sub layer

(D) It has conductive material, so heat transport is faster

41. Lumped heat capacity analysis is of a system in which it is assumed to be

(A) at no uniform temperature

(B) at uniform temperature

(C) either uniform or no uniform temperature

(D) none of the above

42. Baffles in shell side of a shell and tube heat exchanger

(A) increases cross section of shell side liquid

(B) force the liquid to flow parallel to the bank

(C) increase the shell side heat transfer coefficient

(D) Decrease the shell side heat transfer coefficient

43. Following are the advantages of hot working of metals, except

(A) close tolerances can be maintained

(B) porosity of the metal is minimized

(C) grain structure of the metal is refined

(D) no residual stresses are introduced

44. In slush casting process _____

(A) Molten metal is fed into the cavity in metallic mould by gravity

(B) Metal is poured into die cavity and after a predetermined time the mould is inverted to permit a part of metal still in molten state to flow out of cavity

(C) Cavity is filled with a pre-calculated quantity of metal and a core or plunger is inserted to force the metal into cavity

(D) Metal is forced into mould under high pressure

45. Taylor's principle is concerned with

(A) Pneumatic comparators

(B) Interferometry measurements

(C) Gauging measurements

(D) Angular measurements

46. Which of the following are problems with the current rapid prototyping and additive manufacturing technologies?

(A) Limited material variety

(B) Inability to convert a solid part into layers

(C) Poor machinability of the starting material

(D) The inability of the designer to design the part

47. Forging is carried out at which temperature?

(A) Below recrystallization temperature

(B) Above recrystallization temperature

(C) Below or above recrystallization temperature

(D) Above melting point

48. Which of the following materials can be machined using Electro-Chemical Machining?

(A) Hard nonconductive materials

(B) Had conductive materials

(C) All nonconductive materials

(D) None of the mentioned

49. Which of the following statement is wrong?

(A) The hot chamber die casting machine is used for casting zinc, tin, lead and other low melting alloys

(B) The cold chamber die casting machine is used for casting aluminum, magnesium, copper base alloys and other high melting alloys

(C) The castings produced by centrifugal casting method have open and coarse grained structure

(D) The castings produced by centrifugal casting method have fine grained structure

50. The demand and forecast for February are 12000 and 10275, respectively. Using single exponential smoothening method (smoothening coefficient = 0.25), forecast for the month of March is:

(A) 431 (B) 9587

(C) 10706 (D) 11000

Rough Work

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