

Total No. of Printed Pages: 06

No. of Questions : 50

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar
PET 2024 (9042) Doctor of Philosophy(Mechanical Engineering)

(To be filled by the Candidate)

Candidate Seat Number
(As per Admit card)

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OMR Sheet Number

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Invigilator's signature with Date

Candidate's Seat No. in Words : _____

Name of the Center : _____

Paper Code & Name of Examination : **9042- Doctor of Philosophy(Mechanical Engineering)**Date: **03/10/2024****PET 2024 - EXAMINATION**Time: **One Hours**Total Marks: **100****Important Instructions for the candidate**

- Write your seat number and OMR Sheet number on the question paper in the earmarked space
- This question paper carries Fifty (50) Multiple-choice type questions and each question carries 2 Marks
- At the commencement of examination, the question paper will be given to the student.
- Each question has four alternative responses marked (A) (B) (C) and (D). You have to darken the circle as indicated below on the correct response against each question
Example: where (C) is correct answer

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- Your responses to the answer are to be indicated in the OMR Sheet. If you mark at any place other than in the circle in the OMR Sheet it will not be evaluated.
- Rough work is to be done at the end of this question paper.
- You have to return OMR answer sheet and question paper to the invigilator at the end of examination compulsorily and must not carry with you outside the examination hall.
- Use only Black / Blue ball point pen
- Use of any type of calculator or log table etc. is prohibited.
- There is no negative marking for incorrect answers

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

- परीक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात तसेच आपणास दिलेल्या उत्तर पत्रिकेचा क्रमांक त्याखाली लिहावा.
- या प्रश्नपत्रिकेतील सर्व प्रश्न सोडवणे अनिवार्य आहे.
- परीक्षा सुरु झाल्यावर विद्यार्थ्यांला प्रश्नपत्रिका दिली जाईल.
- प्रत्येक प्रश्नासाठी (A) (B) (C) (D) अशी चार विकल्प उत्तरे दिली आहेत, त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा निळा करावा.
उदा: जर (C) हे उत्तर योग्य असेल तर

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- या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे ओएमआर उत्तर पत्रिकेतच दर्शवावीत इतर ठिकाणी लिहिलेली उत्तरे तपासली जाणार नाहीत.
- प्रश्नपत्रिकाच्या शेवटी कोऱ्या जागेवरच कच्चे काम करावे
- परीक्षा संपल्यानंतर विद्यार्थ्यांनी मूळ ओ. एम. आर उत्तरपत्रिका पर्यवेक्षकाकडे परत करणे आवश्यक आहे तथापि प्रश्नपत्रिका व ओ. एम. आर. उत्तरपत्रिका आपल्याबरोबर नेण्यास विद्यार्थ्यांला परवानगी नाही.
- फक्त काळ्या किंवा निळ्या बॉलपेनचाच वापर करावा
- कॅल्क्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही
- चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही

- | Q. No. | Question | | | | |
|--------------------------|--|--------------------------|-------------------------|------------------------|----------------------------|
| 1. | <p>What are valid research definitions from below</p> <p>(A) Discovery of new things that have been independently verified by other professionals</p> <p>(B) Work around to the problem at hand</p> <p>(C) Search for knowledge/Art of scientific investigation</p> <p>(D) Correct b and c</p> | | | | |
| 2. | <p>Select the correct objective of research from below</p> <p>(A) Discover phenomena unknown so far</p> <p>(B) Conduct survey</p> <p>(C) Find the solution according to set procedure</p> <p>(D) B and C both are correct</p> | | | | |
| 3. | <p>Identify correct statement from below:Research</p> <p>(A) Should aim at meaningful contribution and ingenuity</p> <p>(B) Should be based on clear shortcomings/gaps/limitations identified in existing phenomena</p> <p>(C) Should get wider acceptance to the contributions by way of reviewed publications and citations by future works</p> <p>(D) Option A, B and c are correct</p> | | | | |
| 4. | <p>Descriptive type of research does not involve</p> <p>(A) Capturing current state of affairs with no control on factors or variables</p> <p>(B) Extensive experiments and observations</p> <p>(C) Finding the cause for this current state, tries compare/correlate Surveys, fact finding enquiries</p> <p>(D) Obtain information to describe phenomena</p> | | | | |
| 5. | <p>Research based on experiments conducted in the laboratory, taking the observations and then analyzing them is categorized as</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">(A) Qualitative research</td> <td style="width: 50%;">(B) Conceptual research</td> </tr> <tr> <td>(C) Empirical research</td> <td>(D) Descriptive research</td> </tr> </table> | (A) Qualitative research | (B) Conceptual research | (C) Empirical research | (D) Descriptive research |
| (A) Qualitative research | (B) Conceptual research | | | | |
| (C) Empirical research | (D) Descriptive research | | | | |
| 6. | <p>What is a research design?</p> <p>(A) Way of conducting research that is not grounded in theory</p> <p>(B) Choice between using qualitative or quantitative methods</p> <p>(C) Framework for the collection and analysis of data</p> <p>(D) Style to present your research findings</p> | | | | |
| 7. | <p>The probability of selecting an item in probability sampling, from the population is known and is</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">(A) One</td> <td style="width: 50%;">(B) Non-Zero</td> </tr> <tr> <td>(C) Zero</td> <td>(D) Option A and C correct</td> </tr> </table> | (A) One | (B) Non-Zero | (C) Zero | (D) Option A and C correct |
| (A) One | (B) Non-Zero | | | | |
| (C) Zero | (D) Option A and C correct | | | | |
| 8. | <p>What is a cross-sectional design?</p> <p>(A) Comparison of two or more variables longitudinally</p> <p>(B) Collection of data from more than one case at one moment in time</p> <p>(C) Research into one particular section of society</p> <p>(D) Option A and C correct</p> | | | | |

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) It may increase or decreases the sampling error
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. The hypothesis that an analyst is trying to prove is called the:
- (A) Elective hypothesis
 - (B) Alternative hypothesis
 - (C) Optional hypothesis
 - (D) Null hypothesis
18. The level of significance in hypothesis testing is the probability of
- (A) Accepting a true null hypothesis
 - (B) Accepting a false null hypothesis
 - (C) Rejecting a true null hypothesis
 - (D) Option A and B are correct
19. If a hypothesis test leads to the rejection of the null hypothesis
- (A) A Type II error must have been committed
 - (B) A Type II error may have been committed
 - (C) A Type I error must have been committed
 - (D) A Type I error may have been committed

20. To determine whether the test statistic of ANOVA is statistically significant, it can be compared to a critical value. What two pieces of information are needed to determine the critical value?
- (A) Sample size, number of groups (B) Mean, sample standard deviation
(C) Expected frequency, obtained frequency (D) MSTR, MSE
21. The chi-square goodness-of-fit test can be used to test for:
- (A) Significance of sample statistics (B) Difference between population means
(C) Normality (D) Probability
22. The journal impact factor depends upon
- (A) Number of citations (B) Number of publications
(C) Both A and B (D) Number of hits
23. Ontology is
- (A) An Indexing Method
(B) Classification of Internet based documents
(C) Cataloguing of Internet based documents
(D) Documentation service
24. The list of special terms and phrases used in a research report is given in the form of a
- (A) Footnote (B) Glossary
(C) Quotations (D) Bibliography
25. Bibliography means
- (A) Foot Note (B) Quotations
(C) Biography (D) List of books referred
26. In an un-damped system the vibration is initiated with an initial displacement of 5mm. The amplitude of vibration will be
- (A) $< 5 \text{ mm}$ (B) $> 5 \text{ mm}$
(C) $= 5 \text{ mm}$ (D) none of the above
27. In a spring mass system, ($K= 100 \text{ N/m}$, $M= 1 \text{ Kg}$) the mass has to be brought down to the equilibrium position without oscillation in the least possible time when disturbed. The coefficient of the damper to be introduced is
- (A) 20 KN sec/mm (B) 20 N.sec/mm
(C) 10 Kn.sec/cm (D) 10 KN.sec/cm
28. A vibrating system is defined by following parameters $m=3 \text{ kg}$, $k=100 \text{ N/m}$, $C=3 \text{ N-s/m}$. Determine Damping frequency
- (A) 5.75 rad/sec (B) 6.75 rad/sec
(C) 8.30 rad/sec (D) None of these
29. When material is subjected to fatigue loading the ratio of the endurance limit to the ultimate tensile strength is
- (A) 0.20 (B) 0.35
(C) 0.5 (D) 0.65
30. The metal suitable for bearings subjected to light loads is
- (A) Silicon bronze (B) White metal
(C) Monel metal (D) Phosphor bronze

31. Thermoplastic materials are those materials which
 (A) Are formed in to shape under heat and pressure and result in a permanently hard product
 (B) Do not become hard with the application of heat and pressure and no chemical change occur
 (C) Are flexible and can withstand considerable wear under suitable conditions
 (D) Are used as friction lining for clutches and brakes
32. Meta-heuristic techniques are:
 (A) Calculus-based techniques (B) Guided Random Search techniques
 (C) Enumerative techniques (D) Numerative Techniques
33. In operations research, the _____ are prepared for situations.
 (A) The objective function must be non-linear
 (B) All the constraints must be non-linear
 (C) The objective function and all the constraints must be non-linear
 (D) Either the objective function or at least one constraint must be non-linear
34. What is Physical Equation of mass conservation equation for a finite control volume fixed in space?
 (A) Net mass flow through the control surface = constant
 (B) Rate of change of mass inside the control volume = constant
 (C) Net mass flow through the control surface = Rate of change of mass inside the control volume
 (D) Net mass flow through the control surface \neq Rate of change of mass inside the control volume
35. The quantity specifying the flow or motion is termed as ____
 (A) Density (B) Field
 (C) Flux (D) Electrostatic force
36. What is the incompressibility condition in Navier-Stokes equation?
 (A) $\nabla \cdot \mathbf{u} = 0$ (B) $\nabla \cdot \mathbf{u} > 0$
 (C) $\nabla \cdot \mathbf{u} < 0$ (D) $\nabla \cdot \mathbf{u} = 1$
37. Express large scale velocity in terms of K and ϵ
 (A) $\epsilon^{1/2}$ (B) $(\epsilon / K)^{1/2}$
 (C) $K^{1/2}$ (D) $(K / \epsilon)^{1/2}$
38. The curve passing through the _____ of the isenthalpic is called the inversion curve.
 (A) Minima (B) Maxima
 (C) Both of the mentioned (D) None of the mentioned
39. The Pressure of gas in terms of its mean kinetic energy per unit volume E is equal to
 (A) $E/2$ (B) $E/3$
 (C) $2E/3$ (D) $5E/4$
40. Thermodynamic entropy differs from statistical mechanics entropy by a constant _____
 (A) Critical pressure
 (B) Critical pressure & Boltzmann's constant
 (C) Boltzmann's constant
 (D) None of the mentioned
41. Design of condensers use
 (A) Film-wise condensation (B) Drop-wise condensation
 (C) Film-wise & drop-wise condensation (D) None

42. How is the performance of the cooling tower indicated?
 (A) Wet-bulb temperature (B) Dry bulb temperature
 (C) Approach (D) Range
43. A three high rolling mill consists of three rolls placed one above the other. Which of the following statement is correct?
 (A) The upper and middle rolls rotate in the same direction whereas the bottom roll rotates in opposite direction
 (B) The upper and bottom rolls rotate in the same direction whereas the middle roll rotates in opposite direction
 (C) The bottom and middle roll rotate in the same direction
 (D) Any one of the above
44. Blow holes in casting are caused by
 (A) Excessive moisture (B) Low permeability
 (C) Excessive fine grains (D) All of the above
45. In exponential smoothening method, which one of the following is true?
 (A) $0 \leq \alpha \leq 1$ and high value of α is used for stable demand
 (B) $0 \leq \alpha \leq 1$ and high value of α is used for unstable demand
 (C) $\alpha \geq 1$ and high value of α is used for stable demand
 (D) $\alpha \leq 0$ and high value of α is used for unstable demand
46. Forging is carried out at which temperature?
 (A) Below re-crystallization temperature
 (B) Above re-crystallization temperature
 (C) Below or above re-crystallization temperature
 (D) Above melting point
47. Which of the following is NOT the part of the product life cycle
 (A) Introduction (B) Growth
 (C) Maturity (D) Forecasting
48. What is the range of depth-to-diameter ratio in Electron beam machining?
 (A) 2:5 to 2:11 (B) 1:1 to 1:15
 (C) 3:4 to 3:20 (D) 4:5 to 4:19
49. 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
50. _____ helps in establishing the interchangeability of products
 (A) Standardization (B) Simplification
 (C) Diversification (D) Specialization
