

Total No. of Questions: 50

Application No.....



Faculty of Engineering  
Ph.D Entrance Test July-2018  
Mechanical Engineering

**Duration: 2 Hrs.**

**Maximum Marks: 100**

---

1. Name of the Candidate:-----  
(In Capital Letter)
2. Enrollment No:-----
3. Mobile No:-----
4. Highest Qualification:-----
5. Area of Specialization:-----
6. Date of the Test:-----

**Instruction**

1. All questions are compulsory.
2. Each question carries 2 marks.
3. Use ball point pen to answer the question.
4. Scientific Calculators are allowed.
5. No mobile phone is allowed in the examination hall.
6. Any kind of canvassing or use of unfair means in the examination is liable to cancellation of candidature.
7. Any overwriting in the answer will not be considered for evaluation.

**Signature of the Candidate:**

**Signature of the Invigilator**

---

**Marks obtained: -----**

**Signature of the Evaluator**

-----  
**Recommendation of the UPAC**

(Rough Work)

(Fill the answer in corresponding empty column.)

Q.1	<p>The system of the collinear and the parallel force in free body diagrams are simplified as</p> <p>(a) The simplified collinear force system gives us a net force and the parallel force system gives us a simplified force, and then we add it vectorially.</p> <p>(b) Such simplification is not possible.</p> <p>(c) The simplification is usually done by not considering the directions of the both.</p> <p>(d) The simplification is done by considering the rotations only.</p>	
Q.2	<p>The couple is simplified easily by the help of right hand rule in free body diagrams. But the forces simplification is not possible as there is no such system of rules so that the forces can be simplified.</p> <p>(a) The first part of the statement is false and other part is true.</p> <p>(b) The first part of the statement is false and other part is false too.</p> <p>(c) The first part of the statement is true and other part is false.</p> <p>(d) The first part of the statement is true and other part is true too.</p>	
Q.3	<p>A truss is facing a two force member and both of them are in the opposite directions. And the truss is in equilibrium. And both of them are getting away from each other. The forces are called?</p> <p>(a) Compressive forces.</p> <p>(b) Tensile Forces.</p> <p>(c) Parallel and collinear forces with same direction of heading.</p> <p>(d) The rotational forces.</p>	
Q.4	<p>Which of the following is correct for the frames in 2D and machines in 3D?</p> <p>(a) The application of the conditions of the equilibrium of the body is valid only in the 2D.</p> <p>(b) The application of the conditions of the equilibrium of the body is valid only in the 3D.</p> <p>(c) The application of the conditions of the equilibrium of the body is valid only in the 1D.</p> <p>(d) The application of the conditions of the equilibrium of the body is valid throughout.</p>	
Q.5	<p>What kind of elastic materials are derived from a strain energy density function?</p> <p>(a) Cauchy elastic materials. (b) Hypo elastic materials.</p> <p>(c) Hyper elastic materials. (d) None of these</p>	
Q.6	<p>According to IS 456- 2000, the minimum eccentricity subjected to a column is ____</p> <p>(a) 30mm (b) 20mm (c) 45mm (d) 50mm</p>	
Q.7	<p>A steel rod 10mm in diameter and 1m long is heated from 20 to 100 degree celcius, <math>E = 200 \text{ GPa}</math> and coefficient of thermal expansion is <math>12 \times 10^{-6}</math> per degree celcius. Calculate the thermal stress developed?</p> <p>(a) 192 MPa(tensile). (b) 212 MPa(tensile).</p> <p>(c) 192MPa(compressive) (d) 212 MPa(compressive).</p>	
Q.8	<p>Which of the given mechanisms is an exact straight line motion mechanism?</p> <p>(a) Grasshopper mechanism. (b) Robert's mechanism.</p> <p>(c) Peaucellier mechanism. (d) Tchebicheff's mechanism.</p>	
Q.9	<p>Two pipes of diameters <math>d_1</math> and <math>d_2</math> converge to form a pipe of diameter <math>d</math>. If the liquid flows with a velocity of <math>v_1</math> and <math>v_2</math> in the two pipes, what will be the flow velocity in the third pipe?</p> <p>(a) <math>\frac{d_1 v_1 + d_2 v_2}{d}</math> (b) <math>\frac{d^2(v_1 + v_2)}{d}</math> (c) <math>\frac{(d_1 + d_2)^2(v_1 + v_2)}{d^2}</math> (d) <math>\frac{d_1^2 v_1 + d_2^2 v_2}{d^2}</math></p>	



	(a) $\frac{t_o + t_p + t_n}{3}$	(b) $\frac{t_o + 2t_p + t_n}{4}$	(c) $\frac{t_o + 4t_p + t_n}{5}$	(d) $\frac{t_o + t_p + 4t_n}{6}$
Q.23	<p>In a network shown in the below figure, the critical path is along</p> <p>(a) 1-2-3-4-8-9      (b) 1-2-3-5-6-7-8-9      (c) 1-2-3-4-7-8-9      (d) 1-2-5-6-7-8-9</p>			
Q.24	<p>If <math>A</math> is the total items consumed per year, <math>P</math> is the procurement cost per order, and <math>C</math> is the annual inventory carrying cost per item, then the most economic ordering quantity is given by</p> <p>(a) <math>\frac{AP}{C}</math>      (b) <math>\frac{2AP}{C}</math>      (c) <math>\sqrt{\frac{2AP}{C}}</math>      (d) <math>\left(\frac{AP}{C}\right)^2</math></p>			
Q.25	<p>The value engineering technique in which experts of the same rank assemble for product development is called</p> <p>(a) Delphi      (b) Brain storming (c) Morphological analysis      (d) Direct expert comparison</p>			
Q.26	<p>"Internal validity" refers to:</p> <p>(a) Whether or not there is really a causal relationship between two variables (b) Whether or not the findings are relevant to the participants' everyday lives (c) The degree to which the researcher feels that this was a worthwhile project (d) How accurately the measurements represent underlying concepts</p>			
Q.27	<p>In an experimental design, the dependent variable is:</p> <p>(a) The one that is not manipulated and in which any changes are observed (b) The one that is manipulated in order to observe any effects on the other (c) A measure of the extent to which personal values affect research (d) An ambiguous concept whose meaning depends on how it is defined</p>			
Q.28	<p>A deductive theory is one that:</p> <p>(a) Allows theory to emerge out of the data (b) Involves testing an explicitly defined hypothesis (c) Allows for findings to feed back into the stock of knowledge (d) Uses qualitative methods whenever possible</p>			
Q.29	<p>Which of the following is <i>not</i> a data-collection method?</p> <p>(a) Research questions      (b) Unstructured interviewing (c) Postal survey questionnaires      (d) Participant observation</p>			
Q.30	<p>An important practical issue to consider when designing a research project is:</p> <p>(a) Which theoretical perspective you find most interesting (b) Whether or not you have time to retille the bathroom first (c) How much time and money you have to conduct the research (d) Which colour of ring binder to present your work in</p>			

Q.31	Which of the following should be included in a research proposal? (a) Your academic status and experience (b) The difficulties you encountered with your previous reading on the topic (c) Your choice of research methods and reasons for choosing them (d) All of these	
Q.32	Why do you need to review the existing literature? (a) To make sure you have a long list of references (b) Because without it, you could never reach the required word-count (c) To find out what is already known about your area of interest (d) To help in your general studying	
Q.33	What is self-plagiarism? (a) When a person lifts material that they have previously written and pass it off as their own work (b) Talking about yourself too much (c) Using somebody else's work and passing it off as your own (d) An epistemological stance	
Q.34	A simple random sample is one in which: (a) From a random starting point, every nth unit from the sampling frame is selected (b) A non-probability strategy is used, making the results difficult to generalize (c) The researcher has a certain quota of respondents to fill for various social groups (d) Every unit of the population has an equal chance of being selected	
Q.35	The standard error is a statistical measure of: (a) The normal distribution of scores around the sample mean (b) The extent to which a sample mean is likely to differ from the population mean (c) The clustering of scores at each end of a survey scale (d) The degree to which a sample has been accurately stratified	
Q.36	Snowball sampling can help the researcher to: (a) Access deviant or hidden populations (b) Theorise inductively in a qualitative study (c) Overcome the problem of not having an accessible sampling frame (d) All of these	
Q.37	Which of the following is a method that is commonly used in qualitative research? (a) Self-completion questionnaires (b) Surveys (c) Ethnography (d) Structured observation	
Q.38	The flexibility and limited structure of qualitative research designs is an advantage because: (a) The researcher does not impose any predetermined formats on the social world (b) It allows for unexpected results to emerge from the data (c) The researcher can adapt their theories and methods as the project unfolds (d) All of these	
Q.39	What is an outlier? (a) A type of variable that cannot be quantified (b) A compulsive liar who is proud to be gay (c) A score that is left out of the analysis because of missing data (d) An extreme value at either end of a distribution	

Q.40	A ..... is an abstraction formed by generalization from particulars (a) Hypothesis            (b) Variable            (c) Concept            (d) Facts	
Q.41	Concepts are ..... (a) Metaphor            (b) Simile            (c) Symbols            (d) Models	
Q.42	A Hypothesis which develops while planning the research is (a) Null Hypothesis            (b) Working Hypothesis (c) Relational Hypothesis            (d) Descriptive Hypothesis	
Q.43	A Hypothesis must be ..... (a) Diffuse            (b) Specific            (c) Slow            (d) Speedy	
Q.44	A short summary of Technical Report is called (a) Article            (b) Research Abstract (c) Publication            (d) Guide	
Q.45	Reliability is mostly a matter of _____, while validity is mostly about _____ (a) Consistency, accuracy            (b) Accuracy, consistency (c) Similarity, dissimilarity            (d) Similarity, consistency	
Q.46	The introduction chapter is usually _____ % of the total word limit of the dissertation (a) 30            (b) 40            (c) 25            (d) 10	
Q.47	Type-I Error occurs if _____ (a) The null hypothesis is rejected even though it is true (b) The null hypothesis is accepted even though it is false (c) Both the null hypothesis as well as alternative hypothesis are rejected (d) None of these	
Q.48	If X is Adiscrete random variable and f(x) is the probability of X, then the expected value of this random variable is equal to: (a) $\sum f(x)$ (b) $\sum [x+f(x)]$ (c) $\sum f(x)+x$ (d) $\sum xf(x)$	
Q.49	The essence of both basic and applied research lies in (a) Market orientation            (b) Scientific method (c) Performance monitoring research            (d) Costing methods	
Q.50	“Empirically verifiable observation” is (a) Theory            (b) Value            (c) Fact            (d) Statement	