TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)
Delhi Road, Moradabad (U.P.)

SAMPLE QUESTION PAPER FOR RESEARCH APTITUDE TEST IN ELECTRICAL ENGINEERING

Max. Marks: 100 **Time: 2.00 Hrs.**

Note:

1. The question paper is divided into two parts viz. Part A and Part B, carrying 50 marks each.
2. **Part A** consists of 50 multiple choice questions carrying one mark each. All questions are compulsory. There shall be no negative marking. The answers are to be marked on the OMR sheet with black pencil.
3. **Part B** consists of 8 descriptive type questions, out of which any 5 questions are to be answered. Each question shall carry 10 marks. A candidate is expected to limit his answer in about 200 words for each question.

Part (A)

Total Marks: 50 X 1 = 50

Q1.Who said that members of the same species are not alike?

(a) Darwin
(b) Herbert Spencer
(c) Best
(d) Good

Q2. A statistical measure based upon the entire population is called parameter while measure based upon a sample is known as

(a) Sample parameter
(b) Inference
(c) Statistic
(d) None of these

Q3. Generalized conclusion on the basis of a sample is technically known as

(a) Statistical inference of external validity of the research
(b) Data analysis and interpretation
(c) Parameter inference
(d) All of the above

Q4. A researcher selects a probability sample of 100 out of the total population. It is

(a) A cluster sample
(b) A random sample
(c) A stratified sample
(d) A systematic sample

Q5. A researcher divides the population into Postgraduates, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called

(a) stratified sampling
(b) stratified random sampling
(c) representative sampling
(d) none of these

Part (B)

Total Marks: 5 X 10 = 50

Q1. Write short notes on the following:-

a. Basic filter
b. Kirchhoff's law
c. Thevnin's & Norton's Therom

Q2. Explain Fourier series representation of continuous periodic signal?

Q3. a. Explain the conditions of parallel operation of synchronous machine?
b. Explain Sumpner's test

Q4. a. what is Corona, explain its equation.
b. Explain nuclear power station.

Q5. Explain:
a. Controllability and observability
b. Leg-Lead compensation

Q6. Explain high sensibility instrument with its construction, working, and application.

Q7. What do you mean by an operation amplifier? Give its characteristics and applications.

Q8. a. Explain pulse width modulation with a neat sketch.
b. Explain plane wave propagation in dielectric and conducting media.

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SAMPLE QUESTION PAPER FOR RESEARCH APTITUDE TEST IN ELECTRONICS & COMMUNICATION ENGINEERING

Max. Marks: 100 **Time: 2.00 Hrs**

Note:

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2. **Part-A** consists of 50 multiple choice questions carrying one mark each. All questions are compulsory. There shall be no negative marking. The answers are to be marked on the OMR sheet with black pencil.
3. **Part-B** consists of 8 descriptive type questions, out of which any 5 questions are to be answered. Each question shall carry 10 marks. A candidate is expected to limit his answer in about 200 words for each question.

Part (A)

Total Marks: 50 X 1 = 50

Q1.Who said that members of the same species are not alike?
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- (c) Best
- (d) Good

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- (a) Sample parameter
- (b) Inference
- (c) Statistic
- (d) None of these

Q3. Generalized conclusion on the basis of a sample is technically known as
- (a) Statistical inference of external validity of the research
- (b) Data analysis and interpretation
- (c) Parameter inference
- (d) All of the above

Q4. A researcher selects a probability sample of 100 out of the total population. It is
- (a) A cluster sample
- (b) A random sample
- (c) A stratified sample
- (d) A systematic sample

Q5. A researcher divides the population into Postgraduates, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called
- (a) stratified sampling
- (b) stratified random sampling
- (c) representative sampling
- (d) none of these

Part (B)

Total Marks: 5 X 10 = 50

Q1. Write a short note on any one of the following:

(a) Tunnel diode
(b) SCR
(c) TRIC

Q2. How MOSFET is different from JEFT? Explain.

Q3. What is wave guide? What must be the width of rectangular wave guide such that the energy of electromagnetic radiation, whose free space wave length is 3cm, travels down the guide at 95% of the speed of light in principle mode?

Q4. Give brief explanation of ideal Op-amp? A 5mv. 1 KHz sinusoidal is applied to the input of an Op-amp integrator for which R = 100 kΩ and C = µf, find the output voltage.

Q5. We have lead and leg compensation which one work as a high pass filter. Derive the expression for transfer function of that.

Q6. Explain the working of RTD with the help of diagram.

Q7. Explain how the phenomenon of hall effect can be used to determine whether a semiconductor is 'n' type or 'p' type. What are relations between hall coefficient (R_H) and hall voltage (V_H).

Q8. What kind of feedback is used in oscillators and why? What do you mean by Bark hausen criterion for oscillation?

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SAMPLE QUESTION PAPER FOR RESEARCH APTITUDE TEST IN CIVIL ENGINEERING

Max. Marks: 100 **Time: 2.00 Hrs**

Note:

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2. **Part-A** consists of 50 multiple choice questions carrying one mark each. All questions are compulsory. There shall be no negative marking. The answers are to be marked on the OMR sheet with black pencil.
3. **Part-B** consists of 8 descriptive type questions, out of which any 5 questions are to be answered. Each question shall carry 10 marks. A candidate is expected to limit his answer in about 200 words for each question.

Part (A)

Total Marks: 50 X 1 = 50

Q1.Who said that members of the same species are not alike?
- (a) Darwin
- (b) Herbert Spencer
- (c) Best
- (d) Good

Q2. A statistical measure based upon the entire population is called parameter while measure based upon a sample is known as
- (a) Sample parameter
- (b) Inference
- (c) Statistic
- (d) None of these

Q3. Generalized conclusion on the basis of a sample is technically known as
- (a) Statistical inference of external validity of the research
- (b) Data analysis and interpretation
- (c) Parameter inference
- (d) All of the above

Q4. A researcher selects a probability sample of 100 out of the total population. It is
- (a) A cluster sample
- (b) A random sample
- (c) A stratified sample
- (d) A systematic sample

Q5. A researcher divides the population into Postgraduates, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called
- (a) stratified sampling
- (b) stratified random sampling
- (c) representative sampling
- (d) none of these

Part (B)

Total Marks: 5 X 10 = 50

Q1. Write various assumptions in limit state design of RCC structure.

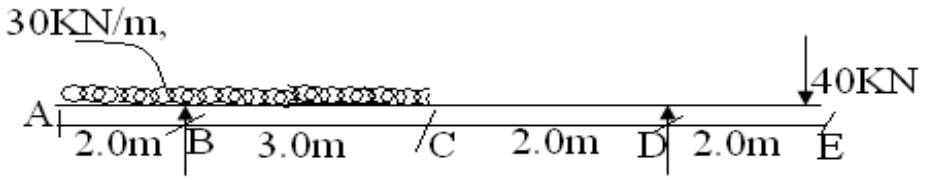
Q2. Derive the expression for deflection of a closed coiled helical spring.

Q3. Name various types of foundations and describe them in brief.

Q4. Describe run off and factors affecting it.

Q5. Describe the design criteria for design of cantilever retaining for wall.

Q6. Draw SFD and BMD for following beam



Q7. Describe the general principles of pre-stressing.

Q8. Write notes on any two of the following:

(a) Workability of concrete
(b) Concrete admixtures
(c) Combined footings.

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SAMPLE QUESTION PAPER FOR RESEARCH APTITUDE TEST IN COMPUTER SCIENCE & ENGINEERING

Max. Marks: 100 **Time: 2.00 Hrs**

Note:

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2. **Part-A** consists of 50 multiple choice questions carrying one mark each. All questions are compulsory. There shall be no negative marking. The answers are to be marked on the OMR sheet with black pencil.
3. **Part-B** consists of 8 descriptive type questions, out of which any 5 questions are to be answered. Each question shall carry 10 marks. A candidate is expected to limit his answer in about 200 words for each question.

Part (A)

Total Marks: 50 X 1 = 50

Q1.Who said that members of the same species are not alike?
- (a) Darwin
- (b) Herbert Spencer
- (c) Best
- (d) Good

Q2. A statistical measure based upon the entire population is called parameter while measure based upon a sample is known as
- (a) Sample parameter
- (b) Inference
- (c) Statistic
- (d) None of these

Q3. Generalized conclusion on the basis of a sample is technically known as
- (a) Statistical inference of external validity of the research
- (b) Data analysis and interpretation
- (c) Parameter inference
- (d) All of the above

Q4. A researcher selects a probability sample of 100 out of the total population. It is
- (a) A cluster sample
- (b) A random sample
- (c) A stratified sample
- (d) A systematic sample

Q5. A researcher divides the population into Postgraduates, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called
- (a) stratified sampling
- (b) stratified random sampling
- (c) representative sampling
- (d) none of these

Part (B)

Total Marks: 5 X 10 = 50

Q1. Differentiate between Greedy and Dynamic Programming.

Q2. Discuss the concept of Router. Differentiate between static and dynamic programming.

Q3. What are the advantages of CMM in terms of Software Industry?

Q4. Write the algorithm for prefix sum for parallel computer.

Q5. Differentiate between public and private key cryptography.

Q6. Elaborate the role of testing in software development.

Q7. Construct a DFA with reduced states equivalent to the regular expression - (a+b)*abb

Q8. Discuss the theory of computation. Also give the Chomsky classification.

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SAMPLE QUESTION PAPER FOR RESEARCH APTITUDE TEST IN MECHANICAL ENGINEERING

Max. Marks: 100 **Time: 2.00 Hrs**

Note:

1. The question paper is divided into two parts viz. Part-A and Part-B, carrying 50 marks each.
2. **Part-A** consists of 50 multiple choice questions carrying one mark each. All questions are compulsory. There shall be no negative marking. The answers are to be marked on the OMR sheet with black pencil.
3. **Part-B** consists of 8 descriptive type questions, out of which any 5 questions are to be answered. Each question shall carry 10 marks. A candidate is expected to limit his answer in about 200 words for each question.

Part (A)

Total Marks: 50 X 1 = 50

Q1.Who said that members of the same species are not alike?
(a) Darwin
(b) Herbert Spencer
(c) Best
(d) Good

Q2. A statistical measure based upon the entire population is called parameter while measure based upon a sample is known as
(a) Sample parameter
(b) Inference
(c) Statistic
(d) None of these

Q3. Generalized conclusion on the basis of a sample is technically known as
(a) Statistical inference of external validity of the research
(b) Data analysis and interpretation
(c) Parameter inference
(d) All of the above

Q4. A researcher selects a probability sample of 100 out of the total population. It is
(a) A cluster sample
(b) A random sample
(c) A stratified sample
(d) A systematic sample

Q5. A researcher divides the population into Postgraduates, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called
(a) stratified sampling
(b) stratified random sampling
(c) representative sampling
(d) none of these

Part (B)

Total Marks: 5 X 10 = 50

Q1. State maximum principal stress theory of failure.

Q2. A linkage has 14 links and the numbers of loops are 5. Calculate its:

(a) Degrees of freedom
(b) Number of joints
(c) Maximum number of ternary links that can be had
(d) Assume that all pairs are turning pairs.

Q3. Explain the process of EDM (Electric Discharge Machining).

Q4. Explain the principles of material handling.

Q5. Derive the basic EOQ (Economic Order Quantity) formula of inventory control along with its assumptions.

Q6. Explain the Kelvin – Planck statement and Clausius' statement of second law of thermodynamics.

Q7. State and prove Bernoulli's equation.

Q8. Derive general heat conduction equation for homogeneous and isotropic material in Cartesian co-ordinates.

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SAMPLE QUESTION PAPER FOR RESEARCH APTITUDE TEST IN PHYSICS

Max. Marks: 100 **Time: 2.00 Hrs**

Note:

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2. **Part-A** consists of 50 multiple choice questions carrying one mark each. All questions are compulsory. There shall be no negative marking. The answers are to be marked on the OMR sheet with black pencil.
3. **Part-B** consists of 9 descriptive type questions, out of which any 5 questions are to be answered. Each question shall carry 10 marks. A candidate is expected to limit his answer in about 200 words for each question.

Part (A)

Total Marks: 50 X 1 = 50

Q1.Who said that members of the same species are not alike?
- (a) Darwin
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- (c) Best
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Q2. A statistical measure based upon the entire population is called parameter while measure based upon a sample is known as
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Q3. Generalized conclusion on the basis of a sample is technically known as
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Q4. A researcher selects a probability sample of 100 out of the total population. It is
- (a) A cluster sample
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- (c) A stratified sample
- (d) A systematic sample

Q5. A researcher divides the population into Postgraduates, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called
- (a) stratified sampling
- (b) stratified random sampling
- (c) representative sampling
- (d) none of these

Part (B)

Total Marks: 5 X 10 = 50

Q1. Define analytic function $u = e^x (X\cos y – Y\sin y)$ then find analytic function $f(z)=u +iv$.

Q2. Drive Cauchy's integral theorem?

Q3. How MOSFET is different from JFET? Explain.

Q4. Define Meissen effect? Explain type l and type ll super conductor.

Q5. Give some basic ideas of BCS theory.

Q6. Outline the free electron model of metal.

Q7. Describe the powdered crystal method of studying crystal structure.

Q8. Explain the liquid drop mode to understand the nature of forces acting of forces acting inside the nucleus.

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SAMPLE QUESTION PAPER FOR RESEARCH APTITUDE TEST IN MATHEMATICS

Max. Marks: 100 **Time: 2.00 Hrs**

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3. **Part-B** consists of 8 descriptive type questions, out of which any 5 questions are to be answered. Each question shall carry 10 marks. A candidate is expected to limit his answer in about 200 words for each question.

Part (A)

Total Marks: 50 X 1 = 50

Q1.Who said that members of the same species are not alike?
- (a) Darwin
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Q2. A statistical measure based upon the entire population is called parameter while measure based upon a sample is known as
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Q5. A researcher divides the population into Postgraduates, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called
- (a) stratified sampling
- (b) stratified random sampling
- (c) representative sampling
- (d) none of these

Part (B)

Total Marks: 5 X 10 = 50

Q1. Prove that if f is a continuous mapping of a compact metric space X in to a metric space Y. Then f is uniformly continuous.

Q2. State and prove Baire's Theorem.

Q3. State and prove Couchy Schwartz Inequality.

Q4. Let L be a limit dimensional linear space and let M_1, M_2 be subspaces of L such that

$L= M_1+ M_2$ and dim $L= M_1$ $L=\dim M_2$
Then, $L = M_1,\oplus M_2$

Q5. State and prove Morera's theorem.

Q6. Given the values

X_i	5	7	11	13	17
Y_i	150	392	1452	2366	5202

Evaluate f(a) using:

(i) Langrange's formula
(ii) Newton's divided difference formula

Q7. Discuss the motion of particle moving under a central force.

Q8. Show that the transformation defined by

$q= \sqrt{[2P]Sin}\ Q$

$p= \sqrt{[2P]Sin}\ Q$ is conical.

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SAMPLE QUESTION PAPER FOR RESEARCH APTITUDE TEST IN CHEMISTRY

Max. Marks: 100 **Time: 2.00 Hrs**

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Part (A)

Total Marks: 50 X 1 = 50

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Q5. A researcher divides the population into Postgraduates, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called
- (a) stratified sampling
- (b) stratified random sampling
- (c) representative sampling
- (d) none of these

Part (B)

Total Marks: 5 X 10 = 50

Q1. Derive the following equation a diatomic molecule:

$$q_{rot} = \frac{8\prod^2 lkT}{\sigma h^2}$$

Q2. Draw and discuss the phase diagram for a three-component system consisting of acetic acid-benzene-water.

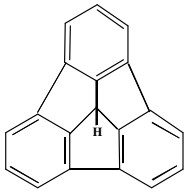
Q3. Explain the terms 'eigen value' and 'eigen function'.

Q4. Show that

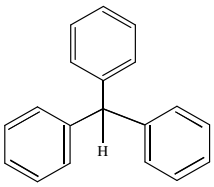
$$[\hat{L}_x, \hat{L}_y] = ih\hat{L}_z$$

Q5. Which of the compounds (A or B) would you expect to be the stronger acid? Give reasons.

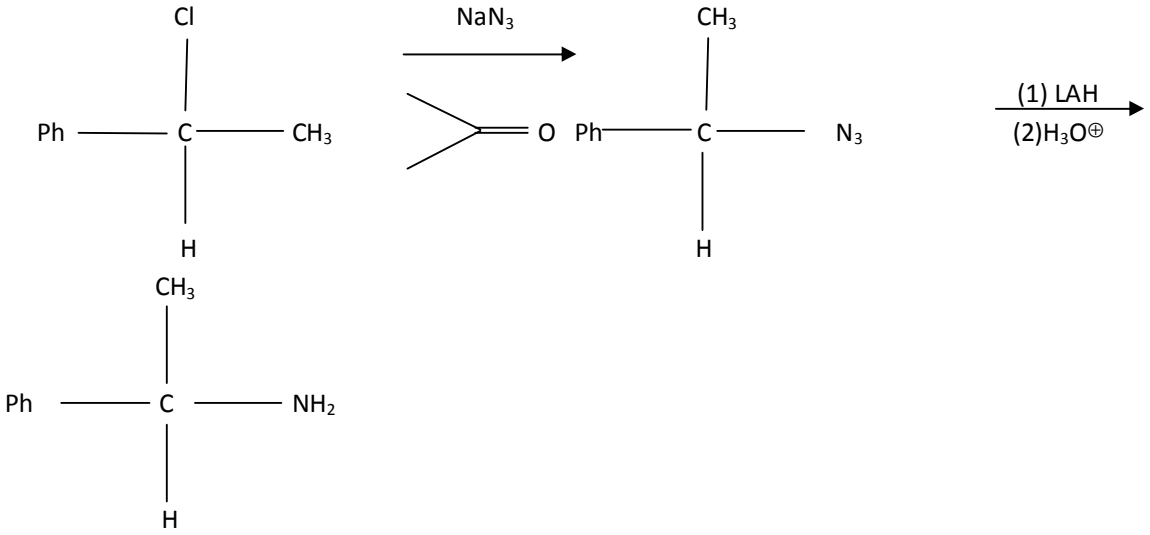
A



B

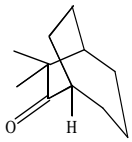


Q6. Briefly account for the stereochemistry of the following reaction sequence.



Q7. Which compound in each of the following pairs would be more extensively enolized? Give suitable reasons also.

(a)



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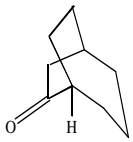
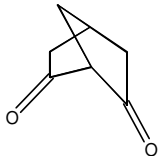


(b)



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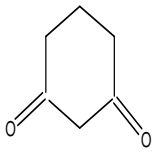

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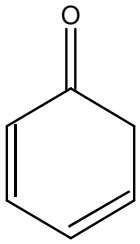

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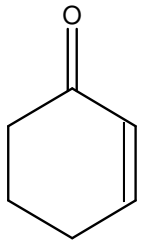
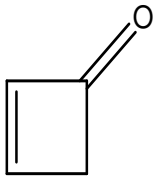


(d)



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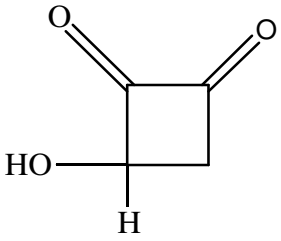

Q8. From each of the following sets select the most reactive and least reactive substrates towards ring nitration.

(a) Benzene, toluene, nitrobenzene and bromobenzene.
(b) Benzene, aniline, acetophenone and acetanilide
(c) m-Dinitrobenzene, m-nitrotoluene and toluene.
(d) Benzene, mesitylene, m-xylene, p-xylene and toluene.
(e) Chlorobenzene, 2,4-dinitrochlorobenzene, and p-nitrochlorobenzene.

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