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6E7111

Roll No. _____ [Total No. of Pages : 2]

6E7111

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Automobile Engineering
6AE3-01 Measurement and Metrology
ME, AE

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

*Attempt **All ten** questions from Part A, **Five questions** out of **Seven questions** from Part B and **Three questions** out of **five questions** in Part C.*

Schematic diagram must be shown wherever necessary. Any data you feel missing suitably be assumed and stated Clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answers should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Define accuracy and precision.
2. Define wringing of slip gauge.
3. State seebeck effect.
4. What is a pyrometer used for?
5. Define roundness.
6. What is a bevel protractor used for? State the principle of its use.
7. What are limit gauges?
8. A load cell gives 2 mV output for 5 kN. Find the sensitivity.
9. What is reproducibility?
10. Name the four key elements of thread measurement.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Explain generalized measurement system with a block diagram.
2. Sine bar (200 mm) is used to measure 30 degrees. Calculate height of slip gauges required.

3. Explain the working of any one mechanical comparator with a sketch. What are advantages and disadvantages of mechanical comparators?
4. A vernier caliper has 0.02 mm least count with MSR = 25 mm and VSR 12. Calculate size.
5. Describe flatness testing using optical flat.
6. In the measurement of surface roughness, height of successive ten peaks and troughs were measured from datum as 35, 25, 32, 20, 23, 18, 26, 24, 28 and 21 microns. If these measurements were obtained on 10 mm lengths, determine the CLA and RMS values for surface roughness.
7. How to check the composite error of the gears by using Parkinson gear testing machine? Explain in detail with a sketch.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. Discuss type of errors in measurement and methods to minimize them.
2. Explain sine bar construction, limitations and applications.
3. What is co-ordinate measuring machine? Explain basic elements and construction of CMM with a neat sketch. How is the probe system for CMM classified?
4. a) Discuss the function of bourdon tube pressure gauge in detail.
   b) Explain torque measurement using strain gauge.
5. Explain flow measurement devices - rotameter, pitot tube and hot wire anemometer.

6E7112

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6E7112

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Automobile Engineering
6AE5-12 CIMS (EL-II)
ME, AE

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

*Attempt **All ten** questions from Part A, **Five questions** out of **Seven questions** from Part B and **Three questions** out of **five questions** from Part C.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated Clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A
(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Define the term "Product Cycle" in the context of CIM.
2. What is the primary difference between NC and CNC?
3. List two features of a Machine Control Unit (MCU).
4. What is the main objective of Adaptive control in machining?
5. Define "Part Families" as used in Group Technology.
6. What is the difference between Retrieval and Generative CAPP?
7. Briefly define Manufacturing Resource Planning (MRP II).
8. Name one non - contact inspection method used in quality control.
9. What is a Flexible Manufacturing System (FMS)?
10. Define "Concurrent Engineering".

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Explain the role of computers in the manufacturing process and data types used.
2. Describe the basic components of a Numerical Control (NC) system.
3. Explain the benefits of using APT (Automatically Programmed Tool) for part programming.

4. Compare traditional process planning with Computer Aided Process Planning (CAPP).
5. Discuss the advantages of using computer - aided inventory management.
6. Describe how computer control is applied to automated material picking and conveying.
7. Explain the concept of "Agile Manufacturing" in modern enterprises.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. Discuss the evolution from NC to CNC and DNC. Explain how CAD/CAM software has simplified NC cutter path verification.
2. Explain the "Part Classification and Coding" systems in Group Technology. How do these systems facilitate the creation of machining cells?
3. Detail the components of a Computer Aided Producton management System, focusing on shop floor control and process monitoring.
4. Analyze the impact of Computer Aided Quality Control (CAQC) on manufacturing. Compare contact and non - contact inspection methods.
5. Define Collaborative Engineering. How do web - based design and extended enterprises contribute to faster design throughput?

6E7113

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6E7113

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Automobile Engineering
6AE4-03 Mechanical Vibrations
ME, AE

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Write any two outcomes of the course "Mechanical Vibrations".
2. Define resonance.
3. State degree of freedom.
4. Write the importance of centre of percussion.
5. What do you mean by 'hysteretic damping?
6. Write the difference between vibration isolation and transmissibility.
7. Define 'Mode shapes'.
8. Write the physically significance of critical speed of a shaft.
9. Why we use 'Dunkerley's method'?
10. State "Continuous System".

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. **(5×4=20)**

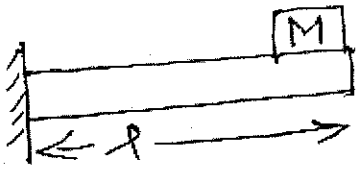
1. Discuss in brief on "industrial noise control strategies".

2. Convert into exponential form

   i) 1 - 2i

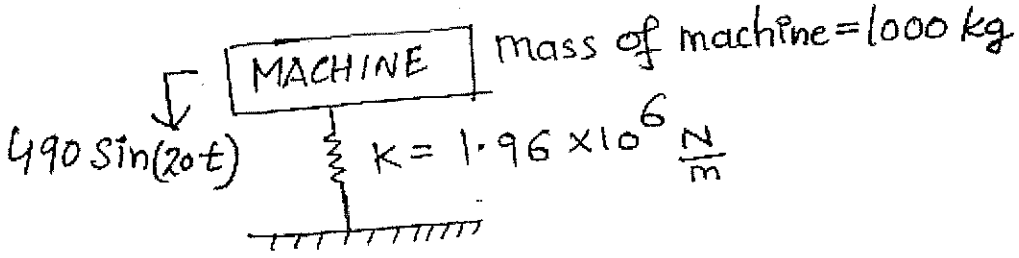
   ii) -1 + 2i

3. Discuss on natural frequency of transverse vibration of following



M is the external Mass and EI is the flexural rigidity of the beam. The weight of beam is negligible. *l* is the length of the beam.

4. Determine the amplitude of the motion of machine (Figure is given below)



The amplitude of the external Force is 490 N.

5. Explain the working principle (in brief) of undamped dynamic vibration absorber with its limitation.

6. Discuss about materials used in vibration isolation.

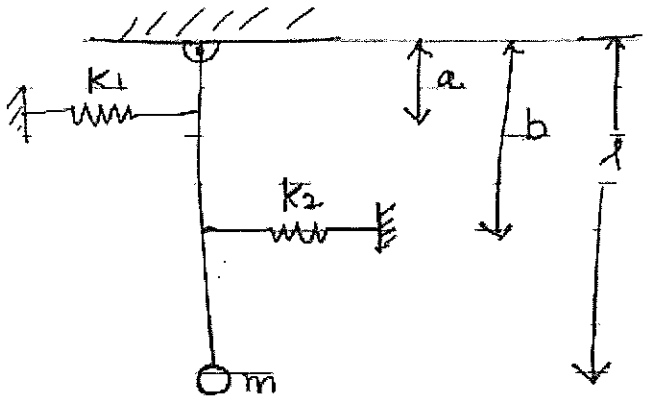
7. Explain Maxwell reciprocal system.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. **(3×10=30)**

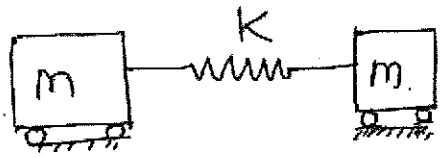
1. Derive an expression for natural frequency of following system (undamped)



M is the point mass. The mass of the vertical string is taken as zero

Write the assumptions also.

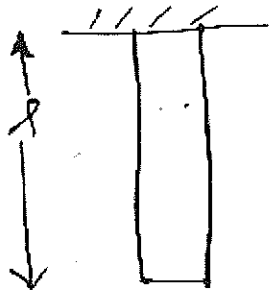
2. Discuss and calculate the principal modes of vibrations of following



$m: 10 \times 10^3$ kg

$K: 2.94 \times 10^6$ N/m

3. Determine the equation for the natural frequencies of a uniform rod subjected to torsional oscillation with one end fixed and the other end free as shown in figure.



4. Split harmonic motion

$x = 10 \sin(\omega t + \frac{\pi}{6})$ into two harmonic motions, one having a phase angle of 0^0 and other of 45^o.

5. Derive an expression for logarithmic decrement and discuss the physical significance of it in the vibration analysis of a mechanical system.

6E7114

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6E7114

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Automobile Engineering
6AE4-05 Design of Machine Elements II
ME, AE

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Differentiate between steady and alternating stresses.
2. Explain the concept of the Goodman line in fatigue design.
3. Discuss the design factors influencing the cylinder of an IC engine.
4. Explain the major stresses acting on a connecting rod in an engine.
5. Define the concept of a helical tension spring.
6. Discuss the design factors for a belt-pulley drive system.
7. Explain the Lewis equation for gear teeth design.
8. Compare and contrast spur and helical gears in terms of design.
9. Explain the concept of minimum film thickness in bearing design.
10. How do you select anti-friction bearings based on load cycles?

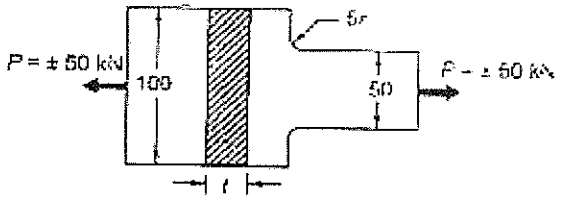
PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. **(5×4=20)**

1. Describe the concept of notch sensitivity and its effect on the design of machine elements subjected to fatigue.

2. A component machined from a plate of steel 45C8 (S_{ut} = 630 N/mm^2) as shown below. It is subjected to completely reversed axial force of 50 kN. The reliability factor is 90% and factor of safety is 2. Determine the endurance limit stress for the plate, if the notch sensitivity factor is 0.8. (Take size factor = 0.85).



3. Explain the influence of material selection for the crankshaft on its performance and reliability.

4. It is required to design a helical compression spring subjected to a maximum force of 1250N. The deflection of the spring corresponding to the maximum force should be approximately 30 mm. The spring index can be taken as 6. The spring is made of patented and cold drawn steel wire of Grade 1. The constants A and m can be taken as 1753 and 0.182 respectively (G = 81.370 N/mm^2). The permissible shear stress for the spring wire should be taken as 50% of the ultimate tensile strength. Determine the wire diameter of the spring.

5. Explain the Buckingham equation and its application in gear tooth design.

6. A ball bearing, subjected to a radial load of 5 kN is expected to have a life of 8000 hours at 1450 rpm with a reliability of 99%. Calculate the dynamic load capacity of the bearing so that it can be selected from the manufacturer's catalogue based on a reliability of 90%.

7. Discuss the importance of bearing mounting and lubrication methods in anti-friction bearing design.

PART - C

(Descriptive/Analytical/Problem solving/Design questions)

Attempt any three questions. **(3×10=30)**

1. Discuss the different methods used to design machine members subjected to combined steady and alternating stresses. Explain how the Goodman and Soderberg lines are used in the design process.

2. The cylinder of a four stroke diesel engine has following specifications:

   Cylinder bore = 150 mm

   Factor of safety = 5

   Maximum gas pressure = 3.5 MPa

   Poisson's ratio = 0.25

   If the cylinder material is grey cast iron FG 200 (S_{ut} = 200 N/mm^2), determine the thickness of cylinder wall.

3. Elaborate on the design of helical compression springs subjected to variable stresses. Discuss factors like spring index, stress concentration, and fatigue life in the design process.

4. Explain the design process for spur gears using the Lewis and Buckingham equations. Include an analysis of factors such as gear tooth profile, material selection, and load distribution in your explanation.

5. A single row deep groove ball bearing no. 6002 is subjected to an axial thrust of 1 kN and a radial load of 2200 N. Find the expected life that 50% of the bearings will complete under this condition.

6E7115

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6E7115

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Automobile Engineering
6AE5-13 Quality Management (EL. - II)
ME, AE

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and suitably and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Define "Quality of Conformance".
2. List two dimensions of quality.
3. What is the difference between "Chance causes" and "Assignable causes" of variation?
4. Name any two of the "Magnificent Seven" tools of SQC.
5. Define the term "Fraction Non-conforming".
6. What is the primary purpose of a Quality Audit?
7. Briefly define the term "AOQL" in acceptance sampling.
8. What is the core focus of the ISO 14000 series?
9. Define "Reliability" in the context of failure models.
10. What does MTBF stand for?

PART - B

(Analytical / Problem solving questions)

Attempt any Five questions. **(5×4=20)**

1. Explain the "Economics of Quality" and how it impacts a production system.
2. Describe the basic principles and statistical basis of a Control Chart.
3. Compare the use of X-bar charts with R-Charts for process control.
4. Explain the concept of Six Sigma and its importance in quality improvement.
5. Discuss the advantages of implementing a Quality Assurance system.
6. Describe the "Operating Characteristics (OC) Curve" used in acceptance sampling.
7. Explain the "Series" and "Parallel" device configurations in reliability evaluation.

PART - C

(Descriptive / Analytical / problem solving / design questions)

Attempt any Three questions. **(3×10=30)**

1. Analyze the modeling of process quality. Discuss how frequency distributions and probability patterns are used to make inferences about process parameters ;
2. Detail the various control charts for attributes (p, np, c, and u charts). Under what conditions should a manufacturer choose an attribute chart over a variable chart?
3. Explain "Process Capability Analysis." How are capability ratios calculated and used to determine if a process is meeting design specifications?
4. Discuss the fundamental concepts of ISO 9000. How does it differ from the Taguchi Method of Design of Experiments?
5. Describe the common failure rate curve (Bathtub Curve). Explain how redundancy can be used as a strategy for reliability improvement

6E7117

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6E7117

B.Tech. VI-Sem. (Main/Back) Examination, April/May - 2026
Mechanical Engineering
6ME5-12 Non Conventional Machining Methods (EI.-II)

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Define Non-Traditional Machining (NTM).
2. List two advantages of non-conventional machining processes.
3. Write any two differences between conventional and non-conventional machining.
4. What is Abrasive Jet Machining (AJM)?
5. Define Metal Removal Rate (MRR).
6. What is Abrasive Flow Machining (AFM)?
7. Write the function of dielectric fluid in EDM.
8. What is Laser Beam Machining (LBM)?
9. Define Electrochemical Machining (CHM)?
10. What is meant by Micro-machining?

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Explain classification of advanced machining processes.
2. Describe the mechanism of martial removal in Ultrasonic Machining.
3. Discuss advantages and limitations of Water Jet Machining.
4. Describe Magnetic Abrasive Finishing for cylindrical surfaces.
5. Explain working principle of Electrical Discharge Machining.
6. Discuss advantages and limitations of Laser Beam Machining.
7. Explain Electrochemical Grinding (ECG).

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. Explain in detail the classification of non-conventional machining processes with examples.
2. Describe the working principle of Abrasive Jet Machining (AJM) and discuss the factor affecting MRR.
3. Explain the process steps, advantages and applications of Chemical Machining (CHM).
4. Write a detailed note on Electron Beam Machining (EBM) and Plasma Arc Machining (PAM).
5. Explain micro-machining and Nano-machining and discuss their industrial applications.