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Total No. of Pages: 02

Total No. of Questions: 07

B.Tech. (ME) (Sem. – 6)

DESIGN OF MACHINE ELEMENTS-II

Subject Code: BTME-601

M.Code: 71185

Date of Examiantion: 23-05-2025

Time: 3 Hrs. Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.
3. Only PSG Design Data Book is allowed in the exam.

SECTION - A

1. Answer in brief :

a) What are the advantages of a wire rope over fibre rope?

b) How are ends of a belt joined?

c) What do you understand by simplex and duplex chains?

d) Discuss the various types of stresses induced in a flywheel rim.

e) Define the term "dynamic load carrying capacity' as applied to rolling contact bearings.

f) List the materials commonly used for the manufacture of the leaf springs.

g) Why extension springs are in considerably less use than the compression springs?

h) Why it is necessary to dissipate the heat generated when clutches operate?

i) List the basic assumptions used in the theory of hydrodynamic lubrication.

j) What are the various materials used for brake linings?

SECTION - B

2. a) Discuss the design procedure of spur gears.

b) Explain the different causes of gear tooth failures and suggest possible remedies to ayoid such failures.

3. Design a journal bearing for a centrifugal pump from the following data: Load on the journal = 20000 N; Speed of the journal = 900 r.p.m.; Type of oil is SAE 10, for which the absolute viscosity at 55°C = 0.017 kg/m-s; Ambient temperature of oil = 15.5°C ; Maximum bearing pressure for the pump = 1.5 N / mm^2. Calculate also mass of the lubricating oil required for artificial cooling, if rise of temperature of oil be limited to 10°C. Heat dissipation coefficient = 1232 $W/m^2/°C$.

4. An otto cycle engine develops 50 kW at 150 r.p.m. with 75 explosions per minute. The change of speed from the commencement to the end of power stroke must not exceed 0.5% of mean on either side. Design a suitable rim section having width four times the depth so that the hoop stress does not exceed 4 MPa. Assume that the flywheel stores 16/15 times the energy stored by the rim and that the workdone during power stroke is 1.40 times the workdone during the cycle. Density of rim material is 7200 kg / m^3.

5. Design a helical spring for a spring loaded safety valve (Ramsbottom safety valve) for the following conditions : Diameter of valve seat = 65 mm ; Operating pressure = 0.7 N/mm^2; Maximum pressure when the valve blows off freely = 0.75 N/mm^2; Maximum lift of the valve when the pressure rises from 0.7 to 0.75 N/mm^2 = 3.5 mm ; Maximum allowable stress = 550 MPa; Modulus of rigidity = 84 kN/mm^2; Spring index = 6. Draw a neat sketch of the free spring showing the main dimensions.

6. A multiple disc clutch, steel on bronze, is to transmit 4.5 kW at 750 r.p.m. The inner radius of the contact is 40 mm and outer radius of the contact is 70 mm. The clutch operates in oil with an expected coefficient of 0.1. The average allowable pressure is 0.35 N/mm^2. Find : 1. The total number of steel and bronze discs; 2. the actual axial force required; 3. the actual average pressure and 4. the actual maximum pressure.

7. A band brake acts on the % th of circumference of a drum of 450 mm diameter which is keyed to the shaft. The band brake provides a braking torque of225 N-m. One end of the band is attached to a fulcrum pin of the lever and the other end to a pin 100 mm from the fulcrum. If the operating force applied at 500 mm from the fulcrum and the coefficient of friction is 0.25, find the operating force when the drum rotates in the anticlockwise direction.

   If the brake lever and pins are to be made of mild steel having permissible stresses for tension and crushing as 70 MPa and for shear 56 MPa, design the shaft, key, lever and pins. The bearing pressure between the pin and the lever may be taken as 8 N/mm^2

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI & ML/EE/FT/IT/CE/CSE/ECE/ME) (Sem.–6)

NON-CONVENTIONAL ENERGY RESOURCES

Subject Code : BTME615-18

M.Code : 79660

Date of Examination:27-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly:**

a) Differentiate between active and passive solar energy systems.

b) What is the importance of orientation and sun tracking in solar collectors?

c) What is a photovoltaic cell?

d) What is the principle behind solar distillation?

e) Mention two disadvantages of biogas plants.

f) Mention two components of a tidal power plant.

g) What are the main components of a Wind Energy Conversion System (WEC)?

h) How is wave energy converted into electricity?

i) Define the working principle of a fuel cell.

j) Mention the two disadvantages of hydrogen energy.

SECTION - B

2. Describe the practical considerations for the installation and maintenance of Flat Plate Collectors.

3. Describe the concept of energy plantations and their contribution to sustainable energy development.

4. Explain the construction and working of a tidal power plant, highlighting its advantages and disadvantages.

5. Discuss the various applications of fuel cells in transportation and industries.

6. What is hydrogen energy? Explain its significance.

SECTION - C

7. a) Compare solar photovoltaic and solar thermal energy systems in terms of efficiency, cost and applications.

   b) Discuss the role of solar PV in rural electrification and its impact on remote communities.

8. a) Compare horizontal-axis and vertical-axis wind turbines in terms of performance.

   b) Discuss the environmental impacts of wind farms.

9. Describe the advantages and disadvantages of biomass gasification. Explain its applications in energy production and compare it with direct combustion methods.

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Total No. of Questions : 09

B.Tech. (Mechanical Engineering/CSE/CE) (Sem.–6)

COMPUTER AIDED DESIGN

Subject Code : BTME613-18

M.Code : 79658

Date of Examination : 27-05-2025

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly:**

a) List different types of coordinate systems used in geometric modeling.

b) Define explicit and implicit equations.

c) Define a spline curve.

d) What are blending functions?

e) What is a Bezier surface?

f) What are composite solids?

g) Explain cell decomposition in solid modeling.

h) Define Constructive Solid Geometry (CSG).

i) Define scaling in the context of transformations.

j) What are analytical properties in assembly design?

SECTION - B

2. What are intrinsic equations? Explain their significance in geometric modeling.

3. What are Non-Uniform Rational B-Splines (NURBS)? Discuss their significance.

4. Describe the representation of plane surfaces in geometric modeling.

5. What is continuity in solid modeling? Describe the different types of continuity.

6. Describe boundary representation (B-rep) and its applications in CAD.

SECTION - C

7. Discuss the historical evolution of geometric modeling and its impact on modern engineering design.

8. Explain the process of reparametrizing a surface patch. Why is this important for numerical computation?

9. Given a set of primitives, demonstrate how graph-based models can be used to represent complex solids.

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (ME) (Sem. – 6)

STATISTICAL AND NUMERICAL METHODS IN ENGINEERING

Subject Code: BTME-604

M Code: 71188

Date of Examination : 27-05-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION - A

1. Write briefly :

a) Define recursion formula for Poisson Distribution.

b) Define the types of errors in sampling.

c) Give applications of Chi - Square test.

d) Discuss the convergence of False position method.

e) State the advantages of Newton – Raphson method.

f) Give the merits of interpolation.

g) Define data array with example.

h) State Taylor's series method.

i) Define Probability mass function.

j) What is Normal distribution?

SECTION - B

2. **Solve the following linear equations :**

   $x + 0.01y - 0.02z = 3.3354$, $0.02x + y - 0.05z = 4.8241$, $0.03x - 0.01y + z = 7.3417$ by using Gauss elimination method.

3. Find a smallest positive root of the equations $x - e^{-x} = 0$ by method of false position correct to three decimal places.

4. Apply Taylor's series method to find the values of y(1.1) and y(1.2) correct to three decimal places given that $\frac{dy}{dx} = xy^{1/3}, y(1) = 1$.

5. **Find the cubic Lagrange's interpolating polynomial from the following data :**

X	0	1	2	5
F(X)	2	3	12	147

6. Find the mean and the variance of Normal distribution.

SECTION - C

7. Find the largest Eigen value of the matrix $A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ using power method.

8. **Obtain cubic spline for every subinterval from the given data :**

X	1	2	3	4
F(X)	1	5	11	8

With the end conditions y" (1) = 0 = y" (4). Hence compute y(1.5).

9. Given the initial value problem: $y' = 1 + y^2$, $y(0) = 0$, Find y(0.6) by Runge Kutta fourth order method taking $h = 0.2$.

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B.Tech. (ME) (Sem.–6)

INTRODUCTION TO INDUSTRIAL MANAGEMENT

Subject Code : BTME604-18

M.Code : 79653

Date of Examination : 20-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Answer briefly:**

a) What is Input Output model in a production system?

b) Enumerate various factors of excellence in service organizations.

c) Briefly explain the need for product planning.

d) What is the industrial cost? Explain the different elements of cost.

e) Define the term "Materials Management".

f) Explain the need for plant maintenance.

g) Enumerate the various objectives of inventory control.

h) Write down the various benefits of Benchmarking.

i) Discuss the role of marketing in today's competitive world.

j) What do you mean by the term "Waste" in manufacturing organization?

SECTION - B

2. Define the term "Industrial Engineering". Discuss in detail the role of Industrial Engineering in the context of manufacturing organizations in today's competitive world.

3. What do you understand by the term "Total Quality Management"? Suggest some strategic measures so that they can succeed in TQM implementation. Also, state benefits of Total Quality Management.

4. Discuss the concept of "Product Design". What is the effect of product design on cost? Also, briefly explain the various factors that affect product design.

5. Differentiate between Centralized & Decentralized purchase organizations. Also, discuss the advantages, disadvantages and applications of these organizations.

6. Briefly explain the duties, functions and responsibilities of the plant maintenance department. Also, differentiate between scheduled maintenance and breakdown maintenance with suitable examples.

SECTION - C

7. a) Define the term "Benchmarking". Describe how benchmarking can be used to improve both efficiency and effectiveness of an organization.

   b) Differentiate between Product Benchmarking and Process benchmarking with suitable examples.

8. a) Design a customer satisfaction questionnaire for the following service industry and Hospital. Justify your answer :

   b) What is the relevance of customer complaints? How would you proceed for handling customer complaints?

9. **Discuss in detail the following :**

   a) ABC Analysis

   b) JIT Cause and Effect Chain

   c) Product Life Cycle.

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B.Tech. (ME) (Sem. – 6)

HEAT TRANSFER

Subject Code: BTME-602

M Code: 71186

Date of Examination : 20-05-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly:**

a) Define heat transfer coefficient. How heat transfer coefficient of a fluid can be increased?

b) What is meant by overall heat transfer coefficient? How it is calculated?

c) Define grey body of radiation.

d) Write the boundary conditions of a fin having negligible heat loss at the tip.

e) What are the limitations of LMTD method?

f) Define Plank's law of radiation.

g) Define Prandtle Number. What is its significance?

h) Define the term pool boiling.

i) What is Newtonian heating of solids?

j) What are the different phases of flow boiling?

SECTION-B

2. Derive conduction equation in linear coordinate system.

3. A steel rod (k = 35 W/m-deg) with 15mm diameter and 60mm length is used as a fin with end insulated. The surrounding temperature is 50°C with h = 60W/m^2-deg. The temperature at the base of the fin is 90°C. Calculate fin efficiency and heat dissipation from the fin. Also find the temperature at the tip of the fin.

4. Prove by dimensional analysis for forced convection that Nusselt no. is a function of Reynold no. and Prandtle no.

5. Explain different regimes of boiling.

6. Derive expression for effectiveness for a parallel flow heat exchanger by NTU.

SECTION-C

7. A pipe of 4cm diameter is maintained at temperature T_1 and is covered with an insulation of k = 0.3 W/mK to reduce the heat loss. The heat is dissipated from the outer surface of insulation in to an ambience at T_a with h = 10W/m^2K. Calculate the thickness of insulation at which the heat dissipation rate would be maximum. Also calculate the ratio of heat loss from the outer surface of insulated pipe and that of the bare pipe for

   a) Thickness of insulation equal to critical thickness

   b) The thickness of insulation is 2cm thicker than the critical thfcknes?

8. Two large parallel plates exchange heat with emissivity 0.3 and 0.7. Find the % age heat reduction when a shield of emissivity 0.04 is placed between them.

9. Derive momentum equation for hydrodynamic boundary layer over a flat plate.

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B.Tech. (Mechanical Engineering)(Sem.–6)

REFRIGERATION AND AIR CONDITIONING

Subject Code : BTME601-18

M.Code : 79650

Date of Examination : 30-04-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) Why is the Carnot cycle not practical for refrigeration?

   b) What is a flash chamber and why is it used?

   c) How is the vapour compression refrigeration system cycle represented on a P-V diagram?

   d) What are the main classifications of refrigerants?

   e) Name two common methods of leak detection in refrigeration systems.

   f) What is the function of an expansion device?

   g) What are the advantages of a vapour absorption system over VCRS?

   h) Define dry air and moist air.

   i) What is heating with dehumidification?

   j) What are the sources of heat load in an air-conditioned space?

SECTION - B

2. Explain the compound compression system with a single evaporator and its advantages over a single-stage system.

3. What are eco-friendly refrigerants and what is the action plan to reduce ecological hazards?

4. Explain the working principles of an expansion device used in refrigeration systems.

5. A room has an air supply at 25°C DBT and 50% RH. Find the specific humidity and enthalpy using a psychometric chart.

6. Define and explain the terms: By-pass factor, Contact factor, Sensible heat factor, Room sensible heat factor and Grand sensible heat factor.

SECTION - C

7. A Freon 22 condensing unit is specified to give 40 TR capacities for air conditioning under standard operating conditions of 40°C condensing and 5°C evaporating temperatures. What would be its capacity in TR for food freezing for which the evaporator temperature is -35°C?

8. **A building has the following calculated cooling loads :**

   RSH gain = 310 kW

   RLH gain = 100 kW

   The space is maintained at the following conditions :

   Room DBT = 24°C

   Room RH = 50%

   Outdoor air is at 28°C and 50% RH, and 10% by mass of air supplied to the building is outdoor air. If the air supplied to the space is not to be at a temperature lower than 18°C, find:

   a) Minimum amount of air supplied to space in m^3/s.

   b) Volume flow rates of return (recirculated) air exhaust airs and outdoor air

   c) State and volume flow rate of air entering the cooling coil.

9. **Write short notes on the following :**

   a) Aqua - ammonia vapour absorption refrigeration system.

   b) Azeotropes and zeotropes.

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B.Tech. (ME) (Sem. – 6)

FLUID MACHINERY

M Code: 71187

Subject Code: BTME-603

Date of Examination : 03-05-2025

Time: 3 Hrs. Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION - A

1. Write briefly :

a. Find force exerted by a jet of water of diameter 75 mm on a stationary plate, when it strikes the plate at 20 m/s.

b. A water jet of diameter 50 mm strikes a plate at an angle of 30°. The force exerted in the direction of jet is 1471.5 N. Determine the rate of flow of water.

c. Drive the relation for force exerted by jet on stationary curved plate when jet strikes the plate at its center.

d. A water jet of diameter 25 mm moving with velocity of 10 m/s. strikes a hinged square plate of weight 98.1 N at its center. Find the angle through which the plate will swing.

e. Draw labelled diagram of hydroelectric power plant.

f. Discuss types of reciprocating pumps and draw any one with a labeled diagram.

g. Calculate power required to drive a single acting reciprocating pump in kW.

h. Draw ideal indicator diagram of a single acting reciprocating pump.

i. Define Thoma's cavitation number.

j. What do you understand by specific speed?

SECTION - B

2. With a neat sketch, explain working of fluid coupling.

3. A water jet of 10 cm diameter strikes a flat plate normally with velocity of 15 m/s. Due to this, the plate moves at 6 m/s in the direction of jet. Find force exerted and work done by jet on plate.

4. A single acting reciprocating pump running at 50 rpm, delivers 0.01 cubic meter of water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine: (i) theoretical discharge of pump (ii) Coefficient of discharge (iii) Slip and percentage slip of the pump.

5. A jet of water of diameter 50 mm, having velocity 20 m/s strikes a curved vane which is moving with velocity of 10 m/s in the direction of jet. The jet leaves the vane at an angle of 60°to the direction of motion of vane at outlet. Determine :

   a. Force exerted by jet on the vane in direction of motion.

   b. Work done per second by jet.

6. Draw and explain the indicator diagram of reciprocating pump by taking acceleration and friction effects.

SECTION - C

7. Discuss various design aspects of Pelton turbine.

8. With neat sketch explain working and principle of simple and differential accumulator.

9. Write short notes on any four :

   a. Commonly used surge tanks and their function.

   b. Air lift pump

   c. Degree of reaction

   d. Reaction Turbines

   e. Euler's equation for energy transfer in turbo machines.

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B.Tech. (Artificial Intelligence & Machine Learning) (Sem.–6)

MACHINE LEARNING

Subject Code : BTCS-619-18

M.Code : 93666

Date of Examination : 03-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) What are the issues on machine learning?

   b) What are the applications of supervised ML in modern business?

   c) What is data reduction?

   d) RMSE

   e) Write different applications of clustering.

   f) What do you mean by active function?

   g) Reinforcement learning.

   h) Training set.

   i) What is a confusion matrix and why do we need it?

   j) Fitness function

SECTION-B

2. What is the ANN? Explain any three activation functions used in NN.

3. Differentiate classification and clustering.

4. What is Gene representation and fitness function, explain?

5. How is KNN different from K-mean clustering? Give detail.

6. What are the needs and applications of association rule learning?

SECTION-C

7. What do you mean by machine learning? Explain its types.

8. What are the data preprocessing methods? Explain any four methods with suitable examples.

9. What is linear regression? Explain in detail using example and list all the assumptions to be met before starting the linear regression.

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B.Tech. (ME) (Sem–6)

MECHANICAL MEASUREMENTS AND METROLOGY

Subject Code : BTME602-18

M.Code : 79651

Date of Examination : 03-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION - A

1. **Write briefly :**

a) Differentiate between primary, secondary and tertiary types of measurements.

b) What is difference between accuracy and precision?

c) What is a sine bar? Explain its application in measurements.

d) Briefly explain the principle employed in manometers used for the measurement of pressure.

e) Suggest suitable one transducer to measure the followings (i) Temperature (ii) Speed (iii) Pressure (iv) Linear distance.

f) Explain "lay" and "Sampling length" in connection with surface texture assessment.

g) What are transducers? Is there difference between Signal and transducer?

h) Define "Surface Texture".

i) What is the purpose of comparators? What are different comparators?

j) What is Pitot Tube?

SECTION - B

2. Explain the working principle of piezo-electric transducer. What are its advantages and limitations?

3. **Explain briefly the following as applied to flow measurement :**

   a) Venturimeter

   b) Orifice plate/meter

4. Explain any two methods to measure velocity.

5. Explain the principle, general construction and observation of stylus type surface texture measuring instrument.

6. **Write a short note on :**

   a) Proving Ring

   b) Mechanical comparator

SECTION - C

7. Describe the construction, theory and working of thermocouples. Discuss the different types of compensations used.

8. Briefly explain the working of strain gauge principle, working and its applications.

9. Explain with a neat diagram the construction and working of a thermoelectric pyrometer?

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B.Tech.(ME) (Sem.–6)

NON-TRADITIONAL MACHINING

Subject Code : DE-ME-2.0

M.Code : 71252

Date of Examination : 06-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION - A

1. **Answer briefly :**

a) What is a flexible manufacturing system? Enumerate types of flexible manufacturing systems.

b) Explain briefly the working principle of Abrasive flow machining process.

c) Why the mechanical properties of work piece materials are not significant in many NTMM?

d) What are the types of feed mechanisms used in USM?

e) Discuss about Electrolytes used in ECM.

f) Explain the effect of initial gap between tool and work piece on process efficiency of ECM.

g) How does the metal removal rate can be increased in EDM Process?

h) Explain the working principle of photo-chemical machining.

i) State the advantages of Plasma Arc Machining.

j) Explain the advantages of the hybrid process over the individual processes.

SECTION - B

2. Classify the non-traditional machining processes. Compare conventional machining processes with non- traditional machining processes.

3. State and explain the mechanism of material removal in water jet machining process. Write its working principle. Give simple sketch of this machining process.

4. Discuss the principle of electric discharge machining, giving a neat sketch. What factors govern the selection of tool material for EDM process?

5. Explain the working principle of Electro-Chemical Machining (ECM) and also elaborate the electrochemistry of the ECM process.

6. Explain the principle, working, applications and limitations of LBM. Compare EBM and LBM processes.

SECTION - C

7. a) Explain briefly the principle and working of Ultrasonic Machining giving a neat sketch and explain the key elements of USM setup.

   b) Sketch a set up for electron beam machining. Discuss the operation of generation of the electric beam giving a neat sketch.

8. a) Describe the characteristic features of various types of plasma arc torches used in Plasma Arc Machining giving neat sketches.

   b) Sketch the set up for electrochemical honing process and describe salient features along with application of the process.

9. a) Explain the various types of maskants used in the chemical machining? Describe their method of application and areas of application.

   b) Explain any hybrid machining process giving a neat sketch.

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Total No. of Questions : 09

B.Tech.(ME) (Sem.–6)

AUTOMOBILE ENGINEERING

Subject Code : BTME603-18

M.Code : 79652

Date of Examination : 06-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION - A

1. **Write briefly :**

a) State the advantages and disadvantages of frameless chassis?

b) What is CRDI system used in modern diesel engines?

c) Enumerate the objectives of engine lubrication?

d) What is Anti-lock Braking System (ABS)?

e) What do you understand by pitching and rolling of a vehicle?

f) Describe the principle of torque converter.

g) What do you mean by fading of brakes?

h) Discuss the role of 'camber' and 'castor' in steering system.

i) Briefly explain about engine tuning.

j) What is overdrive in automobiles? Explain.

SECTION - B

2. Discuss the engine emission control by 3-way catalytic converter system.

3. Differentiate between rigid axle and independent suspension system. Discuss the working of Wishbone type independent system with a neat diagram.

4. What is the steering ratio? Briefly explain the principle and working of Rack and pinion steering gear system with a neat sketch.

5. What do you mean by battery testing? Discuss types of battery tests/methods for battery testing.

6. Briefly explain the following terms in the context of vehicle safety in modern automobiles: EBD, ESP and collapsible steering system.

SECTION - C

7. Differentiate between drum and disc brakes. Also, discuss the working of a Master cylinder in hydraulic brake system with a neat diagram.

8. What are the requirements of an ignition system? Differentiate between conventional and transistorized ignition systems. Also, discuss briefly the working of a battery ignition system with a neat diagram.

9. **Discuss in detail the working of the following with a neat diagram :**

   a) Centrifugal clutch

   b) Differential

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.