

ME-1861
Examination –May-2022
B.Tech. VI Sem : Mechanical Engineering
Manufacturing Science

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

Note: Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a, b & c are compulsory while Part d has internal Choice. Assume missing data, if any.

Word limit be observed as follows:

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Part c – Max 100 words and Part d – Max 400 words.

Word limit NOT to be followed for diagram, numerical, derivation.

- Q.1 (a) How are chips formed? 02
 (b) How are cutting tool classified? 02
 (c) Explain Briefly the region of heat generation in metal cutting. 03
 (d) During the Orthogonal cutting of mild steel at 2m/s with rake angle 15deg. The width of cut and depth of cut are 5mm and 0.18mm, respectively. The shear angle was measured to be 34deg. If the cutting force and thrust force are 500N and 200N, respectively. Calculate the percentage of total energy that is dissipated in shear plane during cutting. 07

OR

Explain mechanism of chip formation during machining of metal. 07

- Q.2 (a) Define the term “wear”? 02
 (b) What are the function of cutting fluids? 02
 (c) State the factors on which machinability depends? 03
 (d) What are the broad general classifications of cutting fluids? 07

OR

Name the various cutting tool material. Discuss briefly Cemented carbide, Carbon steel Stellites, high speed steel. 07

- Q.3 (a) Define the process of Mechanical working of metals? 02
 (b) What is difference between wire and rod? 02
 (c) Which of the idealized stress-strain causes is applicable for each of the following process 03
 (i) Hot forging for copper product
 (ii) Cold rolling of steel sheet
 (d) It is required to draw a 6 mm diameter wire at a reduction 20% at speed 3m/s. The wire is made of annealed copper with hardening parameter $K = 315\text{Mpa}$, $n = 0.54$. The semi dia angle is 6 deg. and coefficient of friction is 0.1. Calculate following 07
 (1) The ideal pressure
 (2) The pressure which friction is considered
 (3) The total pressure
 (4) The drawing force and Power

OR

How are surface area to volume ratio of a forging affect the design of die? 07

- Q.4 (a) What are the function of chip breaker? 02
(b) What are difference between jigs and fixtures? 02
(c) What are diamond pins, how they are used? 03
(d) What is drill Jigs? What is difference between drill jigs and a fixtures? 07

OR

Enumerate various types of fixtures? Explain briefly following fixtures 07

- (i) Turning fixtures
- (ii) Milling fixtures
- (iii) Indexing fixtures

- Q.5 (a) Define Computer Aided Manufacturing? 02
(b) List the benefits of CIM. 02
(c) Give with suitable example the use of IOT in Manufacturing. 03
(d) What are the normally used sequence to establish an effective manufacturing process? 07

OR

Discuss briefly the strategies integrated product design and process design. 07

ME-1862 (B)
Examination –May-June - 2022
B.Tech. VI Sem : Mechanical Engineering
Mechatronics and Automation

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

Note: Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a, b & c are compulsory while Part d has internal Choice. Assume missing data, if any.

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- Q.1 (a) Explain the procedure for determining the transfer functions of a control systems. 02
 (b) What is mathematical model of a control system? 02
 (c) What is the use of block diagram reduction technique? 03
 (d) Analyze steady state and transient state analysis. 07

OR

Analyse Mass-spring-damper system as the mathematical model for any application. 07

- Q.2 (a) What's the difference between sensors and transducers? 02
 (b) What are the characteristics parameters used in transducers? 02
 (c) What is the relative error of an observation taken by an infrared sensor which predicts the distance of an object to be 4cm but the actual value is 3.8cm? 03
 (d) Analyze Piezoelectric sensors and its applications. 07

OR

Analyze operational amplifier and its applications. 07

- Q.3 (a) Which component of a hydraulic system is used to store the sufficient amount of hydraulic oil? 02
 (b) What is the function of the air dryer? 02
 (c) What are the main selection criteria for selection of hydraulic pumps? 03
 (d) Analyze basic pneumatic system with the applications. 07

OR

Analyze basic Aircraft Hydraulic System Components? 07

- Q.4 (a) What is the largest integer number that a PLC counter function can reach if it uses a 16 bit register? 02
- (b) What is a mechanical actuators? 02
- (c) Explain the different types of Electric Actuators. 03
- (d) Analyze input and output devices of PLC. 07

OR

Analyze the PLC components. And PLC applications. 07

- Q.5 (a) What are the three principal components of AIDC technologies ? 02
- (b) Analyze the Merits and Demerits of automation. 02
- (c) Explain different Types of AIDC Technologies for Data Capturing. 03
- (d) Write a note on : 07
- (1) Autonomous Mobile Robot ... AMR
- (2) Automated Guided Vehicle... AGV

OR

Write a note on : 07

- (1) Automatic Identification and Data Capturing (AIDC) Technology
- (2) The technologies included in 4.0 industry.

ME-1862(C)
Examination – May-June-2022
B.Tech. VI Sem: Mechanical Engineering
Computer Integrated Manufacturing

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

Note: Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a, b & c are compulsory while Part d has internal Choice. Assume missing data, if any.

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- Q.1 (a) Define the term Computer Integrated Manufacturing. 02
 (b) List the hardware and software required for CIM. 02
 (c) Explain Integration and rationalization related to CIM system. 03
 (d) Explain the elements of Computer Integrated Manufacturing system. 07

OR

Draw the CIM wheel. Explain its components. 07

- Q.2 (a) What is fixed automation and state its features. 02
 (b) Write short note on transfer function in control theory. 02
 (c) Explain the USA principle approach to automation and process improvement. 03
 (d) What is automation migration strategy? Explain three phases of automation migration strategy. 07

OR

Define Adaptive Control System. Explain the three functions performed by adaptive control system to evaluate the performance and respond accordingly. 07

- Q.3 (a) Define DNC. List its advantages. 02
 (b) Differentiate between absolute and incremental programming mode. 02
 (c) State the advantages to be gained by using CNC compared to NC. 03
 (d) Explain following CNC part programming methods. 07
 (i) Manual part programming
 (ii) NC part programming using CAD/CAM

OR

Explain the following G – code and M – code: 07

- (i) G01 (ii) G71 (iii) M03

- Q.4 (a) What is an automated guided vehicle? List the type of AGV used in manufacturing automation. 02

- (b) Define AS/RS. State the major components of an AS/RS. 02
(c) Define a Robot. Briefly explain the classification of Robots. 03
(d) Explain the applications for which robots are generally used. 07

OR

What are the methods used for programming a Robot? Explain. 07

- Q.5 (a) Define the term Group technology and state its importance in the present manufacturing scenario. 02
(b) State the basis for forming groups in group technology. 02
(c) Define Artificial Intelligence and state characteristics of AI. 03
(d) Explain the OPTIZ coding system generally used in group technology. 07

OR

What do you understand by term flexibility in FMS? Explain the various types of flexibilities that are relevant. 07

ME-1863(A)
Examination –May-June - 2022
B.Tech. VI Sem: Mechanical Engineering
Automobile Engineering

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

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- Q.1 (a) What are various types of Automobiles? 02
 (b) What do you understand chassis of an automobile? 02
 (c) Write the various functions of chassis frame in an automobile? 03
 (d) With respect to the fitting of the engine, how can you classify the different types of chassis? Explain each in brief 07

OR

Discuss in detail the aerodynamic consideration in body profiling of automobile? 07

- Q.2 (a) What is the function of Front axle Beam? 02
 (b) What do you understand by Toe-in and Toe-out of wheels? 02
 (c) What do you understand by king pin inclination and steering axis inclinations? 03
 (d) Describe the working principle of steering system with help of neat sketch? What are the requirements of good steering system? 07

OR

What do you understand by under-steer and over-steer? Explain with suitable sketches. 07

- Q.3 (a) Why is transmission system necessary in an automobile? 02
 (b) What do you understand by double declutching? 02
 (c) Why do we have a differential in automobile? Discuss its working principle? 03
 (d) What is clutch? Discuss its functions? Explain the working of single plate clutch with the help of neat sketch? 07

OR

Discuss the performance characteristics of a torque converter? Suggest methods to minimize the losses to improve the transmission efficiency. 07

- Q.4 (a) What is independent suspension system of automobiles? 02
(b) Explain shock absorber? 02
(c) What are the requirements of good braking system? 03
(d) Explain with neat sketch the constructional features of the leaf spring used as a suspension device? 07

OR

What are hydraulic brakes? On what principle this braking systems works? Describe its construction and working with the help of a suitable diagram? 07

- Q.5 (a) What is storage battery? 02
(b) What is turbo charging of an automobile? 02
(c) Describe in details the construction features of lead-acid battery. 03
(d) Describe the construction and working of Bendix drive with suitable sketch. 07

OR

How the exhaust gas recirculation system is reduces the NO_x emissions? 07

ME-1863(B)
Examination – May-June - 2022
B.Tech. VI Sem: Mechanical Engineering
Turbo Machinery

Time : 3 Hrs

Max. Marks : 70
Min. Marks : 22

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- Q.1 (a) What do you mean by shrouded and unshrouded turbo machines? 02
 (b) What is moment of momentum equation? 02
 (c) Define Turbo machine. Explain the principal components of turbo machine. 03
 (d) Derive the general Euler's equation for a turbo machine. 07

OR

Explain the application of the first law of thermodynamics to the turbo machines. 07

- Q.2 (a) Names different losses in a steam turbine. 02
 (b) Define diagram efficiency for an impulse turbine. 02
 (c) Differentiate between the impulse turbine and reaction turbine. 03
 (d) Derive an expression for maximum blade efficiency in an impulse turbine. 07

OR

In a reaction turbine, the fixed blade and moving blade are of the same shape but reversed in direction. The angles of the receiving tips are 35° and of the discharging tip 20° . Find the power developed per pair of blades for a steam consumption of 2.5 kg/s, when the blade speed is 50 m/s. 07

- Q.3 (a) Define hydraulic efficiency of a turbine. 02
 (b) What do you mean by specific speed of a turbine? 02
 (c) What is draft tube? Explain the functions of a draft tube. 03
 (d) Give the detailed classification of hydraulic turbines. 07

OR

Two jets strike the buckets of a Pelton wheel, which is having shaft power as 15450 W. 07
 The diameter of each jet is given as 200 mm. If the net head on the turbine is 400 mm, find the overall efficiency of the turbine. Take $C_v=1.0$.

- Q.4 (a) State the classification of air compressor and blowers. 02
(b) Define surging of air flow compressor. 02
(c) Compare axial flow and centrifugal compressor. 03
(d) Derive an expression for degree of reaction for an axial flow compressor. 07

OR

Describe the polytropic and isentropic efficiencies. 07

- Q.5 (a) What are power transmitting turbo machines? 02
(b) Define slip of a fluid coupling. 02
(c) Differentiate between positive displacement machines and turbo machines. 03
(d) What is a hydraulic coupling? Explain with a neat sketch the working of a hydraulic coupling. 07

OR

Explain detail about hydraulic press. 07

ME-1864(A)
Examination – May-June - 2022
B.Tech. VI Sem: Mechanical Engineering
Industrial Engineering & Management

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

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- Q.1 (a) State the characteristics of batch production. 02
 (b) Difference Between Production And Manufacturing? 02
 (c) Brief describe Maslow theory of hierarchy of needs. 03
 (d) Explain partial productivity measures and total productivity measures. Also state the advantages and limitations of both. 07

OR

The following information regarding the output produced and inputs consumed for a particular company is available; 07

Output = Rs 20,000, Human input = Rs 1000, Material input = Rs 2000,
 Capital input = Rs 3000, Energy input = Rs 1000, Other Misc. input = Rs 500.
 Find the Partial productivity and Total Productivity.

- Q.2 (a) What is the purpose of work study? 02
 (b) Name the various recording techniques used in method study. 02
 (c) What are cycle graph and Chrono cycle graph? 03
 (d) Write a short note on: 07
 1. Simo Chart
 2. Memo motion study

OR

The following estimates of time have been made in connection with the manufacture of a component 07

Loading pieces into machines = 30 seconds
 Starting the machine and engaging the feed lever = 10seconds
 Running time (automatic stop at the end) = 300 seconds
 Unloading components = 20 seconds
 Inspecting components = 20 seconds
 Parking components in the box = 40 seconds
 Compute the cycle time and draw the activity chart of the operator and machine.

- Q.3 (a) Write the procedure of work measurement. 02
(b) What are the various system in use of “Predetermined motion time standard? 02
(c) State the advantages and limitations of work sampling over time study 03
(d) What do you mean by work factor? Give its classifications also explain in brief what is M-T-M (method time measurement). 07

OR

Assuming that total observed time for an operation of an assembling an electric switch is 1.00 min. If the rating is 120%, find the normal time. If allowances of 10% allowed for the operation. Determine the standard time. 07

- Q.4 (a) What is human factor engineering? 02
(b) What are the applications of ergonomics? 02
(c) Write note on Biomechanics. 03
(d) How does the human stamina depends on environmental factor? Explain. 07

OR

Explain psychology of work. How much work load should be given to human for better working? 07

- Q.5 (a) Differentiate between loading and scheduling. 02
(b) What is the position of PPC in a work organization? 02
(c) What is Gantt Chart? 03
(d) Explain how can you plan the productive capacity of a plant. 07

OR

What do you understand by the “Follow up” function of production planning and control? Explain. 07

ME-1865
Examination – May-June - 2022
B.Tech. VI Sem: Mechanical Engineering
Introduction to Economy and Finance

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

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- Q.1 (a) Write a workable definition of economics. 02
 (b) What are main sectors of an economy? 02
 (c) Define the term elasticity and its effect on demand. 03
 (d) What are the salient feature of Indiana economy? 07

OR

What are the factors that affect the demand and supply? Show the effects on demand and supply curve. 07

- Q.2 (a) Differentiate between money market and capital market. 02
 (b) What is theory of interest rate? 02
 (c) Write a note on importance of financial institutions. 03
 (d) What is inflation? Discuss its causes, effects on economy and individual. 07

OR

How financial instruments are classified on the basis of tenure. Discuss with examples 07

- Q.3 (a) List some of the main advantages of financial instruments over other. 02
 (b) Who are major borrower and investor in financial market? 02
 (c) What is equity? What is the meaning of Ltd. in any organization. 03
 (d) What are major risks associated in the financial market. Discuss 07

OR

An investor has a ten year corporate bond with coupon rate of 9.5% issued in 2016. 07
 After six year the investor intends to sell the bond in open market where YTM is 6.7%.
 What should be the fair value of bond in open market?

- Q.4 (a) What is accounting? 02
(b) What are accounting standards? 03
(c) What is the importance of financial statements of a company? 07
(d) What are liability and asset of any company? Discuss with examples on major heads in a balance sheet. 07

OR

State and discuss three major financial statements with their significance in assessing health of a company. 07

- Q.5 (a) Differentiate bias, prejudice and heuristic. 02
(b) List the participants in forex market. 02
(c) What is law of one price? 03
(d) How rational and behavioral economics are different in the context of decision making. Justify your answer with some common examples. 07

OR

What are the short term and long term factors that affect the forex rate? If interest rate in India is 6% and in Japan is 1%, calculate six month forward rate if present rate is INR/JPY 1.7 07
