Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech**

RBM1B001

1st Semester Regular/Back Examination 2019-20

BASIC MECHANICAL ENGINEERING

BRANCH : AEIE, AERO, AG, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, CST, ECE, EEE, EIE, ELECTRICAL, ELECTRICAL & C.E, ELECTRONICS & C.E, ENV, ETC, FASHION, FAT, IEE, IT, ITE, MANUFAC, MANUTECH, MARINE, MECH, METTA, METTAMIN, MINERAL, MINING, MME, PE, PLASTIC, PT, TEXTILE

Max Marks : 100

Time : 3 Hours

Q.CODE : HRB779

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 **Only Short Answer Type Questions (Answer All-10)** **(2 x 10)**

a) List the limitations of first law of thermodynamics.

b) Define triple poin.

c) State the different modes of heat transfer.

d) What are human comfort conditions?

e) Define buoyancy.

f) Define welding.

g) State any two applications of screwed fasteners.

h) List the functions of a Riser.

i) Define core.

j) Name two alloys and their applications.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Entropy of the universe is increasing. Explain.

b) Draw P-V diagram of an Otto cycle and explain the processes.

c) Why compression ration of petrol engine is less compared to diesel engine?

d) Compare the working of two stroke and four stroke IC engines.

e) Explain the working principle of centrifugal pump with a neat sketch.

f) Distinguish between a heat engine and a refrigerator.

g) How thin sheets are manufactured? Explain.

h) Explain the working of a thermocouple.

i) Discuss the various properties of engineering materials.

j) Discuss different types of defects occur during casting.

k) Explain the principle of sine bar.

l) How the torque is measured using Prony brake dynamometer? Explain.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Derive an expression for the air standard efficiency of a diesel cycle. **(16)**

Q4 Explain the working principle of Oxy-Acetylene welding with a schematic diagram. **(16)**

Q5 What are the methods of strain measurement? Explain the working principle of electrical resistance strain gauge. **(16)**

Q6 **Write short note on the following :**

a) Use of steam table **(8)**

b) Thermodynamic properties of steam **(8)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech**

RBM1B001

1st Semester Regular Examination 2019-20

BASIC MECHANICAL ENGINEERING (BSC LE)

BRANCH : AEIE, AERO, AG, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FASHION, FAT, IEE, IT, ITE, MANUFAC, MANUTECH, MARINE, MECH, METTA, METTAMIN, MINERAL, MINING, MME, PE, PLASTIC, PT, TEXTILE

Max Marks : 100

Time : 3 Hours

Q.CODE : HR778

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 **Only Short Answer Type Questions (Answer All-10)** **(2 x 10)**

a) What are the different systems in Thermodynamics?

b) Why priming is required in pump?

c) State the different modes of heat transfer.

d) Write an expression for efficiency of a heat engine.

e) What is a turbine?

f) List any two uses of gear drive.

g) What is the function of brake?

h) Write the Bernoulli equation for an ideal fluid.

i) What is the function of cores in the casting process?

j) What is the value of modulus of elasticity of steel?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Discuss the impact of refrigerants on environment.

b) Draw P-V diagram of a Carnot cycle and explain the processes.

c) Classify the different types of boilers.

d) Compare the working of two stroke and four stroke IC engines.

e) Explain the working principle of reciprocating compressor with a neat sketch.

f) Differentiate between welding and brazing.

g) Write short note on rolling process.

h) Explain the working of a thermocouple.

i) Describe the working principle of strain measurement.

j) Write down the procedure for developing a mould for a component.

k) Explain the working of a cone clutch in an automobile.

l) What are the advantages of alloys over pure metallic materials in engineering applications?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 It is desired to compress 20 kg of gas from 2.5 m^3 to 0.5m^3at constant pressure of 20 bar. During this compression process, the temperature rises from 20^0Cto 140^0C and increase in internal energy is 3500 kJ. Calculate the work done, heat inter action and change in enthalpy during the process. Also, find out the average value of specific heat at constant pressure. **(16)**

Q4 Explain the working of a steam power plant with a neat sketch. **(16)**

Q5 Draw a neat sketch and explain the sand casting process. **(16)**

Q6 With the help of neat sketch, explain the working principle of Prony brake dynamometer. **(16)**

Registration No: | | | | | | | | | | |

Total Number of Pages: 02

B.TECH
PBE1B101

1st Semester Regular/Back Examination 2017-18
BASICS OF MECHANICAL ENGINEERING
BRANCH: AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FAT, IT, MANUTECH, MECH, METTA, MINERAL, MINING, MME, PE, PLASTIC, PT

Time: 3 Hours

Max Marks: 100

Q.CODE: B902

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1 Answer the following questions: ***multiple type or dash fill up type*** **(2 x 10)**

a) All-------- functions are thermodynamic properties.
b) --------- law of thermodynamics tell about the law of conservation of energy.
c) Latent heat of steam ---------- with increase in pressure.
d) C.O.P. of refrigerator is ratio of ------- and --------.
e) A general relationship between the shear stress and velocity gradient for Newtonian fluid is----------.
f) Forging involves --------deformation of the material to get desired shape.
g) -------- is used to shape the inside of a tube during extrusion of tubes.
h) The properties of composite materials are-------- from the properties of their constituent materials.
i) In thermocouples the temperature is measured by change in------- property.
j) A washer is normally used to------- the load in a threaded fastener.

Q2 Answer the following questions: ***Short answer type*** **(2 x 10)**

a) Explain about reversible and irreversible process with example.
b) Show that the entropy of Universe is increasing.
c) Define critical point and triple point.
d) Name the components of steam power plan with their function.
e) Define viscosity and state its unit of measurement.
f) Differentiate the homogeneous and heterogeneous welding process.
g) Write about the different processes commonly used for wire drawing.
h) Draw the stress strain diagram for ductile and brittle material.
i) What is the principle of strain gauge?
j) How coupling differ from gearing?

Part – B (Answer any four questions)

Q3 **a)** A gas whose pressure, volume and temperature are 275KN/m^2, 0.09m^2 and 185^{0}C respectively, has the state changed at constant pressure, until its temperature becomes 15^{0}C. Calculate (i) Heat transferred, (ii) work **(10)**

done during the process and (iii) change in internal energy. Take R=0.29LJ/KgK and C_p=1.005Kj/KgK for Gas.

b) A reversible heat engine absorbs 1400KJ as heat from a source at 600^0C and delivers 700KJ as work and rejects the rest of the energy to a sink. Find the temperature of the sink. **(5)**

Q4 **a)** 20kg of water at 40^0C is heated at a constant pressure of 10 bar until it becomes superheated vapour at 300^0C. Find the changes in volume, enthalpy, internal energy and entropy. **(9)**

b) Calculate the heat required to form2.5kg of dry steam at 1.1 MPa from water at 20^0C. Determine the amount of heat removed at constant pressure to cause the steam to become 0.985 dry. Calculate the specific volume at respective conditions. **(6)**

Q5 **a)** Explain in detail with line diagram the working of a two stroke petrol engine. **(10)**

b) Explain what to mean by single acting and double acting air compressor. **(5)**

Q6 **a)** Describe the different modes of heat transfer with suitable examples. Also state and derive the Newton's low of cooling. **(10)**

b) The pressure inside an air bubble of diameter 0.01mm is 29.2kPa in excess of ambient pressure. Workout the surface tension at air water interface. **(5)**

Q7 **a)** Explain in detail with line diagram the turning operation and also different types of turning operations. **(10)**

b) Describe the steps in casting process for producing a product. **(5)**

Q8 **a)** Explain about the different categories of engineering materials with specific applications. **(10)**

b) Describe the working principle of venturimeter with its advantages. **(5)**

Q9 **a)** Explain the function of a clutch and different types of clutches with their relative advantages and disadvantages. **(10)**

b) Classify the brake on basis of mode of operations. **(5)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech**
PBE1B101

1st Semester Back Examination 2019-20
BASICS OF MECHANICAL ENGINEERING
BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FAT, IEE, IT, MANUFAC, MANUTECH, MECH, METTA, MINERAL, MINING, MME, PE, PLASTIC, PT, TEXTILE
Max Marks : 100
Time : 3 Hours
Q.CODE : HB711

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Only Short Answer Type Questions (Answer All-10)** **(2 x 10)**

a) State the first law of thermodynamics applied for a process.
b) Define closed cycle.
c) What is meant by ton of refrigeration?
d) Write an expression for COP of a refrigerator.
e) Classify the Steel material as per the carbon percentage.
f) List any two machining operations that are performed on a lathe.
g) What is the function of clutch?
h) What is the function of Riser used in casting process?
i) State the two basic difference between belt and chain drive.
j) Give two examples of alloys.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Explain the various psychometric process involved in air conditioning using psychometric chart.
b) Draw T-S diagram of a Carnot cycle and explain the process.
c) Write a short note on impact of refrigerants on environment.
d) Differentiate between DBT and WBT.
e) With neat sketch explain the working principle of centrifugal air compressor.
f) Differentiate between soldering and brazing.
g) Write a short note on forging process.
h) Explain the different types of power transmission drives.
i) Differentiate between enthalpy and entropy.
j) Differentiate between up milling and down milling.
k) Explain the working of a cone clutch in an automobile.
l) Explain the different types of brakes.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 In an ideal diesel cycle, the temperature at the beginning and end of compression is 60^0c and 600^0c, respectively. The temperature at the beginning and end of the expansion is 1600^0c and 800^0c. Determine the ideal efficiency of the cycle. Take γ = 1.4. If compression ratio is 15 and pressure at the beginning is 1 bar, calculate the maximum pressure in the cycle. **(16)**

Q4 With the help of neat sketch explain the constructional details and working principle of Francis turbine. **(16)**

Q5 Draw a neat sketch of lathe machine and explain the functions of its different parts. **(16)**

Q6 Explain the working of gear drive and belt drive with the help of neat sketches. **(16)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech.**
PBE2B103

2nd Semester Regular / Back Examination 2017-18
BASICS OF MECHANICAL ENGINEERING
BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FAT, IEE, IT, MANUFAC, MANUTECH, MECH, METTA, MINERAL, MINING, MME, PE, PLASTIC, PT, TEXTILE
Time : 3 Hours
Max Marks : 100
Q.CODE : C924
Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

Q1 **Answer the following questions: *multiple type or dash fill up type*** **(2 x 10)**

a) --------- law of thermodynamics tell about the law of entropy.
b) A series of state changes such that the final state is identical with initial state is known as----------.
c) A device which increases the velocity of a fluid at the expenses of its pressure drop is known as ----------.
d) The pressure at a point in a static fluid is equal in all direction is known as ----------.
e) A device which operating in a cycle, maintains a body at a temperature lower than the temperature of the surrounding is known as ----------.
f) Spark plug usually used in ---------- engine.
g) The unit of dynamic viscosity is ----------.
h) ---------- casting is best for parts that are too complicated for other casting methods.
i) Dynamometer is a transducer used to measure----------.
j) When austenite is oil cooled, it produces----------.

Q2 **Answer the following questions: *Short answer type:*** **(2 x 10)**

a) What is the difference between macroscopic and microscopic approach?
b) Explain zeroth law of thermodynamics with example.
c) Distinguish between flow work and displacement work.
d) What is meant by PMM2 and why it is not possible?
e) Define critical point and triple point.
f) What is the difference between isentropic process and adiabatic process?
g) What is Bernoulli's equation? List the assumptions which are made while deriving Bernoulli's equation.
h) Define yield strength. What is its importance?
i) What are the advantages of die casting process over sand casting?
j) What do you mean by gear train?

Part – B (Answer any four questions)

Q3 **a)** 680 kg of fish at 5^0C are to be frozen and stored at -12^0C.The specific heat of fish above freezing point is 3.182 and below freezing point is 1.717 kJ/kg. The freezing point is -2^0C, and the latent heat of fusion is 234.5 kJ/kg. How much heat must be removed to cool the fish, and what percent of this is latent heat? **(10)**

b) A mass of 8 kg expands within a flexible container so that the p-v relationship is of the form $pv^{1.2}$ = constant. The initial pressure is 1000 kPa and the initial volume is $1m^3$. The final pressure is 5 kPa. If specific internal energy of the gas decreases by 40 kJ/kg, find the heat transfer in magnitude and direction. **(5)**

Q4 **a)** Air at a temperature of 15 ^{0}C passes through a heat exchanger at a velocity of 30 m/s where its temperature is raised to 800 ^{0}C.It then enters a turbine with the same velocity of 30 m/s and expands until the temperature falls to 650 ^{0}C. On leaving turbine, the air is taken at a velocity of 60 m/s to a nozzle where it expands until the temperature is fallen to 500 ^{0}C. If the air flow rate is 2 kg/s, calculate (a) the rate of heat transfer to the air in the heat exchanger, (b) the power output from the turbine assuming no heat loss, and (c) the velocity at exit from the nozzle, assuming no heat loss. Take the enthalpy of air as $h = c_p t$, where c_p is the specific heat equal to 1.005 kJ/kg K and t is the temperature. **(10)**

b) A heat pump working on the Carnot cycle takes in heat from a reservoir at 5 ^{0}C and delivers heat to a reservoir at 60 ^{0}C. The heat pump is driven by a reversible heat engine which takes in heat from a reservoir at 840^0C and rejects heat to a reservoir at 60 ^{0}C. The reversible heat engine also drives a machine that absorbs 30 kW. If the heat pump extracts 17 kJ/s from the 5 ^{0}C reservoir, determine (a) the rate of heat supply from the 840^0C source, and (b) the rate of heat rejection to the 60 ^{0}C sink. **(5)**

Q5 **a)** A large insulated vessel is divided into two chambers, one containing 5 kg of dry saturated steam at 0.2 MPa and the other 10 kg of steam, 0.8 quality at 0.5 MPa. If the partition between the chambers is removed and the steam is mixed thoroughly and allowed to settle, find the final pressure, steam quality, and entropy change in the process. **(10)**

b) 0.5 kg of air is compressed reversibly and adiabatically from 80 KPa, 60 ^{0}C to 0.4 MPa, and is than expanded at constant pressure to the original volume. Sketch theses processes on the p-v and t-s planes. Compute the heat transfer and work transfer for the whole path. **(5)**

Q6 **a)** Explain in detail with line diagram the working of a four stroke petrol engine. **(10)**

b) Explain the working of steam power plant and give its layout. **(5)**

Q7 **a)** Explain the energy losses due to flow in pipes. **(10)**

b) What do you mean by heat exchanger? Mention types and example of heat exchanger. **(5)**

Q8 **a)** Discuss about casting defects and their remedies. **(10)**

b) Define extrusion process. Compare extrusion and rolling process. **(5)**

Q9 **a)** Explain about different gears used to transmit power between parallel shaft. **(10)**

b) Explain working of Pitot tube with sketch. **(5)**

Registration No : | 2 | 2 | 0 | 1 | 2 | 1 | 4 | 0 | 6 | 5 |

Total Number of Pages : 02

B.Tech/
Integrated Dual Degree (B.Tech and M.Tech)
RBM2B001

2nd Semester Reg/Back Examination: 2022-23
Basic Mechanical Engineering
AEIE, AUTO, CHEM, CIVIL, CST, CSEAI, CSEDS, CSE, CSEAIME, EEE, ELECTRICAL, ECE,ETC,EIE,IT,MECH,MME,METTA,MINERAL,AE,BIOTECH,ELECTRICAL & C.E
Time : 3 Hour
Max Marks : 100
Q. Code : M491

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** (2 x 10)

a) Distinguish between flow work and displacement work.
b) Define critical point and triple point.
c) What is the difference between isentropic process and adiabatic process?
d) What is the function of clutch?
e) Show that the entropy of the universe is increasing.
f) Name two instruments for torque measurements.
g) How coupling differ from gearing?
h) What is the principle of strain gauge?
i) What is the DOF of a cylindrical joint used in a robot?
j) Which sensor is used to identify the distance between the obstacle and robot?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) A reversible heat engine absorbs 1400KJ as heat from a source at 600^{0}C and delivers 700KJ as work and rejects the rest of the energy to a sink. Find the temperature of the sink.
b) 20kg of water at 70^{0}C is heated at a constant pressure of 10 bar until it becomes superheated vapour at 300^{0}C. Find the changes in volume, enthalpy, internal energy and entropy.
c) Calculate the heat required to form 2.5kg of dry steam at 1.1 MPa from water at 40^{0}C. Determine the amount of heat removed at constant pressure to cause the steam to become 0.985 dry. Calculate the specific volume at respective conditions.
d) Draw T-S diagram of a Carnot cycle and explain the process.
e) Explain the different types of power transmission drives.
f) Explain the different types of brakes.
g) Explain the working of a cone clutch in an automobile.
h) Write short note on different types of gear drives you know.

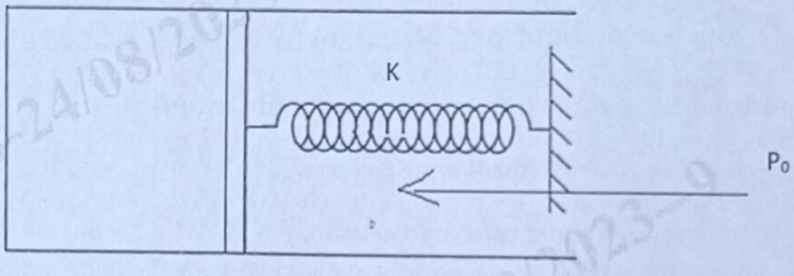
i) Write first and second laws of thermodynamics and make a comparison between the two.

j) A mass of air is initially at 260°C and 700 kPa, and occupies 0.028 m^3. The air is expanded at constant pressure to 0.084 m^3. A polytropic pocess with n = 1.5 is then carried out followed by a constant temperature process which completes a cycle. All the processes are reversible.

i) draw the *p-v* diagram.

ii) find the heat received and rejected in the cycle.

k) A cylinder-piston assembly shown below contains 0.1 m^3 of the gas at 1bar. At this stage, the spring does not exert any force on the piston. The atmospheric pressure P_0 is 1 bar. Now the gas is heated until its volume is doubled. At this point the gas pressure is 4 bar. The area of the piston is 10^{-2} m^2. Determine the spring constant k.



l) Discuss on common robot configurations.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain in detail with line diagram the working of a two stroke petrol engine. (8)

Explain the working principle of four stroke diesel engine. (8)

Q4 Draw a schematic diagram to show different parts of a thermal power plant and explain their functions briefly. (16)

Q5 Explain the function of a clutch and different types of clutches with their relative advantages and disadvantages (8)

Write short notes on (8)

(i) Strain measurement

(ii) Working principle of a refrigerator

Q6 Show Robot anatomy with a neat diagram and briefly write the function of different components. (12)

Explain different types and joints usually present in a manipulator. (4)