10112

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Reg. No.:_____ Name:_____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. Distinguish between the terms 'entropy' and 'enthalpy'.
2. List out different applications any one of turbo machines.
3. When you purchase an air conditioning unit, one of its specifications is given in TR. What does this mean?
4. Give any 3 different classifications of automobiles.
5. Apply Grashof's law to any 4-bar mechanism.
6. Define the term mechanical advantage.
7. Mention any 3 applications of composites.
8. Name any three alloys and give their applications.

PART B

Answer any 2 complete questions from each module.

MODULE 1 *(6x2 = 12 Marks)*

9. A) What is irreversibility? What causes it?
   B) State Clausius inequality and its significance
10. State Kelvin Plank and Clausius statements of second law of thermodynamics and give their physical significance.
11. List any three renewable power sources and compare their advantages and disadvantages

MODULE 2 *(6x2 = 12 Marks)*

12. With help of a neat sketch explain working of a four stroke diesel engine.
13. A) Write 3 significant events in the history of development of modern steam turbine.
    B) List the applications of gas turbines
14. Differentiate between impulse and reaction turbines

MODULE 3 *(6x2 = 12 Marks)*

15. Give 6 different applications of refrigeration.
16. What are the different psychrometric operations in an air conditioning system?
17. With help of a diagram explain working of an All-water air conditioning system

MODULE 4 *(6x2 = 12 Marks)*

18. Write a short note of current scenario of Indian automobile sector.
19. What are the major components of an automobile? Give special emphasis to their function.
20. Give the different types of air craft engines and their applications

MODULE 5 *(7x2 = 14Marks)*

21. Distinguish between planer, spherical and spatial mechanisms with help of suitable examples.
22. Explain 6 different kinds of kinematic pairs giving examples to each one of them.
23. Give an account of different types of loads considered during design of a machine element.

MODULE 6 *(7x2 = 14Marks)*

24. Discuss about any three different types of manufacturing methods that are practiced nowadays.
25. With help of block diagram explain the philosophy of Computer Integrated Manufacturing
26. What do you understand by lean production and agile manufacturing?

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Reg. No.:_____ Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2016

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. State two classical statements of second law of thermodynamics.
2. List the broad classification of air compressor and give the application of each type.
3. List the application of refrigeration in construction industry.
4. What is meant by chassis of an automobile?
5. Define the following : (i) Rigid Body, (ii) Resistant Body
6. What is Grashof's law?
7. Differentiate between BCC and FCC structures.
8. Give any three advantages of composites.

PART B

Answer any 2 complete questions from each module

MODULE 1

9. Define the terms (a) Thermodynamic System, (b) State, (c) Process, (d) Control mass (e) Control volume (f) Control surface (6)
10. Explain first law of thermodynamics, its limitations and how these limitations are addressed by the second law of thermodynamics. (6)
11. a) A man inside a closed room switched on the ceiling fan hoping to reduce the temperature of the room. Is his intuition justified thermodynamically? Give reason for your answer. (3)

    b) The use of electric heaters to heat up living spaces in colder countries is said to be thermodynamically inefficient. Discuss the reason. (3)

MODULE 2

12. List the various components of IC engine and their functions with the aid of a neat diagram. (6)
13. Explain the working of two stroke CI engine with neat sketch. (6)
14. a) Differentiate between Solid Propellant Rockets and Liquid Propellant Rockets? (3)

    b) Discuss the recent (last decade) space programmes of ISRO? (3)

MODULE 3

15. What are the different methods of food preservation? Which is the best method?(6)
16. Explain the components of Air conditioning systems. (6)
17. a)Give 3 historically significant inventions in the development of refrigeration. (3)

    b) What are the different types of refrigerated storages? (3)

MODULE 4

18. List the major components required to transmit power from the engine to an automobiles wheels. Mention the function of each component. (6)
19. a)Differentiate between Front wheel drive, Back wheel drive and All wheel drive in automobiles. (3)

    b) List the various applications of automobiles. (3)
20. a)What is aerodynamics? (2)

    b) Compare turbo prop and turbo jet engines (4)

MODULE 5

21. Define machine, mechanism and structure. Give examples for each. (7)
22. Explain the different types of load considered for engineering design purpose. (7)
23. Define link, pair and kinematic chain. Differentiate between kinematic chain and mechanism. (7)

MODULE 6

24. Explain the classification of engineering materials. (7)
25. List any 4 material testing methods and their applications. (7)
26. Explain computer integrated manufacturing and its applications. (7)

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Reg. No.:_____ Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPTEMBER 2016

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer ALL questions. Each question carries 3 marks

1. Carnot engine cannot find practical significance. Why?
2. Why are piston heads of two stroke engines made crown shaped?
3. Define Humidity ratio and Relative humidity.
4. Explain function of clutch in an automobile
5. What is Kutzbach criteria?
6. Give the significance of factor of safety in designing.
7. Differentiate between alloys and composites.
8. Briefly explain agile manufacturing.

PART B

Answer any 2 complete questions from each module

MODULE 1

9. Explain the working of Carnot engine with P-V and T-S diagrams (6)
10. a) Explain the concept of thermodynamic equilibrium (3)

    b) State the first law of thermodynamics for a closed system undergoing a cycle. In a cyclic process, heat transfers are +14.7 kJ, -25.2 kJ, -3.56kJ and +31.5 kJ. What is the net work for this cyclic process? (3)
11. An inventor claims to have created an engine which produces useful work from the internal energy of the atmosphere. Discuss the validity of his claim by stating the relevant laws of thermodynamics. (6)

MODULE 2

12. What are hydraulic turbines? Differentiate between hydraulic turbines, gas turbines and steam turbines. (6)
13. Differentiate between two stroke and four stroke engines (6)

14. Explain the working principle of chemical rockets. How are chemical rockets classified? (6)

MODULE 3

15. a)Differentiate between refrigeration and air conditioning (3)

    b) State briefly the impact of Freon's (CFC's) on refrigeration and air conditioning (3)

16. What are the advantages, disadvantages and applications of All air systems and All water systems. (6)

17. a) What are the conditions required for human comfort? (4)

    b) Draw comfort chart (2)

MODULE 4

18. Name 6 major automobile manufacturers in India and list 3 of their popular models. (6)

19. Explain any 6 ways of classifying automobiles (6)

20. Explain the aerodynamic forces acting on a body in flight (6)

MODULE 5

21. Explain the different types of lower kinematic pairs with neat sketches. (7)

22. a) Explain any 4 types of engineering design? (4)

    b) Explain mechanical advantage. (3)

23. a) What is the relevance of codes & standards in manufacturing systems? (4)

    b) What is meant by reliability? (3)

MODULE 6

24. What is meant by heat treatment? List any two heat treatment process and their purpose. (7)

25. Explain any four methods of manufacturing. (7)

26. a) If you have to test a specimen without breaking it, what method will you suggests for the testing? Why? (3)

    b) Mention any two metal joining processes and name any one product made by these methods. (4)

Reg. No._____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2017

Course Code**: BE101-02**

Course Name**: INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES**

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two questions completely

1. a. What are the limitations of the first law of thermodynamics? How are these limitations addressed by the second law of thermodynamics? (4)

   b. An inventor is claiming to have developed an engine that produces 110 kW of power by absorbing heat at the rate of 200 kJ/s. Is this claim valid if the engine operates between 500 ºC and 100 ºC? (4)

   c. Differentiate between renewable and non-renewable sources of power with examples for each. (4)

   d. Explain the working principle of chemical rockets. (3)

2. a. What is a Carnot engine? What is its significance? Why is it not practical? (6)

   b. State any one application each of zeroth law, first law and second law of thermodynamics. (3)

   c. Give any 3 applications of IC engines. (3)

   d. Mention three significant events in Indian space programme. (3)

3. a. What is meant by available energy and irreversibility? (4)

   b. List three historically significant events in the development of steam engines. (3)

   c. With the aid of a diagram, explain the working of a two stroke petrol engine. (5)

   d. List any 2 types of air compressors and their applications. (3)

PART B

Answer any two questions completely

4. a. Explain the different types of refrigerated storage. (3)

   b. Differentiate between refrigeration and air-conditioning. (3)

   c. What are the applications of refrigeration in chemical and process industries? (5)

   d. Explain the function of cooling system and ignition system in an automobile. (4)

5. a. List two important events in the history of refrigeration. (2)

   b. Define (i) Dew point temperature (ii) Specific Humidity and (iii) Relative humidity (3)

c. Mention any 3 types of classification of automobiles with examples for each type. (6)

d. Define drag and lift and explain their significance for a body in flight. (4)

6. a. What are the factors affecting human comfort in an air-conditioned space? (4)

b. List any three car manufacturers in India and the cars they produce. (3)

c. Name the main components in the power train of an automobile and give their functions. (5)

d. Name three types of jet engines and their applications. (3)

PART C

Answer any two questions completely

7. a. What is meant by an alloy? What is the purpose of alloying? (2)

b. Explain BCC and FCC structures with the help of the figure of a unit cell. (6)

c. Name five material property tests for engineering materials with their purpose. (5)

d. List any four advantages and three disadvantages of CNC machines. (7)

8. a. List two main characteristics of composites and ceramics and give examples for each. (6)

b. Define (i) Toughness (ii) Hardness (iii) Ductility and (iv) Malleability. (4)

c. Classify manufacturing process for materials with examples for each class. (8)

d. Identify a possible manufacturing process for the following products:
(i) Plastic bottle (ii) Rubber hose (iii) Turbine blades (iv) Steel rod. (2)

9. a. How are engineering materials classified? Give examples. (5)

b. Name and define 5 operations that can be performed on a lathe. (5)

c. Explain and classify (i) Forging (ii) Rolling. (6)

d. Name two products that can be produced by each of the following processes:
(i) Welding (ii) Soldering (iii) Extrusion (iv) Casting. (4)

Reg. No._____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017

Course Code**: BE101-02**

Course Name**: INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES.**

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions.

1. a) State the difference between extensive, intensive & specific properties. Quote examples. (6)
   b) What is the essence of first law of thermodynamics? Write down expressions for first law applied to a (i) a process (ii) a cycle. What are limitations of first law? (6)
   c) What is meant by available energy? (3)

2. a) Explain carnot cycle. (3)
   b) A Carnot engine receives 800kJ of heat per cycle from a high temperature reservoir at $400\,°C$ and rejects heat at $20\,°C$. Find the theoretical efficiency of the cycle and amount of heat rejected to low temperature heat reservoir. (6)
   c) Narrate the history of development of steam engine, steam turbine & hydraulic turbines. (6)

3. a) Sketch and explain the working principle of Francis Turbine. (5)
   b) Explain the working of a four stroke SI engine. (5)
   c) What are the applications of air compressors? Explain the working principle of centrifugal air compressor. (5)

PART B

Answer any two full questions.

4. a) Draw the schematic diagram of a vapour compression refrigeration system and show the process in T-S diagram. (5)
   b) Compare the advantages and disadvantages of food preservation using refrigeration and freezing. (5)
   c) Draw the block diagram and explain the working of a window AC unit. (5)
5. a) Sketch and explain the working of a Fuel pump. (6)
   b) What are the different types of scavenging system in automobiles? (6)
   c) Explain Winter and Summer air conditioning. (3)
6. a) Define Lift, Drag and Thrust in aerodynamics. (5)
   b) Draw a block diagram representing the power line from engine to wheel of an automobile (Rear wheel drive) and name the components. (5)

c) What are the types of gas turbine engines used in air craft and write their basic differences. (5)

PART C

Answer any two full questions.

7. a) How engineering materials are classified? Give two examples for each group. (5)
   b) Define Crystal Lattice, Unit cell and Packing factor. (5)
   c) What is a composite? List four engineered composites and give their applications. (5)
   d) Draw a typical stress strain curve for mild steel and mark the salient points. (5)
8. a) What are the main mechanical and magnetic properties of materials? (5)
   b) List any four Destructive material testing methods and explain. (5)
   c) Distinguish between soldering, brazing & welding. (5)
   d) What are the different types of flames in Oxy Acetylene gas welding process? Explain. (5)
9. a) With a neat sketch, explain forging operations. Give two specific advantages of forging over casting method. (7)
   b) Draw the block diagram of a lathe and explain the various lathe operations. (6)
   c) List the advantages of CNC machining over conventional machining operations.(4)
   d) Give one example each for a part manufactured by casting, rolling, extrusion and forging. (3)

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Total Pages: 2

Reg. No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two questions, each carries 15 marks. Marks

1	a)	Differentiate between intensive and extensive properties. Categories the following properties into intensive or extensive. i) Pressure ii) Energy iii) Volume iv) Specific entropy	(4)
	b)	Write the two statements for second law of thermodynamics along with the applications.	(4)
	c)	Explain the working of two stroke - petrol engine with neat diagrams.	(4)
	d)	What are the applications of air compressors?	(3)
2	a)	What is irreversibility? Explain the causes of irreversibility.	(5)
	b)	What is entropy? Explain the principle of increase of entropy.	(4)
	c)	If the availability of water is less and head is large. Suggest the name of turbine to be installed at that site. With neat sketch explain the components and working of that turbine.	(6)
3	a)	What is a Carnot engine? Explain its significance with Carnot cycle.	(4)
	b)	Differentiate between impulse and reaction steam turbines.	(4)
	c)	What is the principle behind rocket propulsion? Mention any two significant events in Indian space programme.	(3)
	d)	Differentiate between SI and CI engines.	(4)

PART B

Answer any two questions, each carries 15 marks.

4	a)	What are the applications of refrigeration in process and chemical industries?	(4)
	b)	Define the following: i) Humidity ratio ii) Relative humidity iii) Dew point temperature.	(3)
	c)	Write any 4 types of classification of automobiles with examples for each type.	(4)
	d)	Explain the aerodynamic forces with their significance in flight of a body.	(4)
5	a)	Differentiate between refrigeration and air conditioning.	(3)
	b)	Explain summer air conditioning and winter air conditioning with diagrams.	(5)
	c)	Mention any four important automobile manufacturers in India and their products.	(4)
	d)	What are COP of refrigeration and unit of refrigeration?	(3)
6	a)	What is psychrometry? Explain its significance with the help of psychrometric chart.	(4)
	b)	Write the major components of automobiles with their functions.	(6)
	c)	With schematic diagram explain any two types of aircraft engines with their applications.	(5)

PART C

Answer any two questions, each carries 20 marks.

7	a)	Explain the following crystallographic structures. i)BCC and ii)FCC	(6)
	b)	Define the following: i) Hardness ii) Toughness iii) Creep iv) Fatigue v) Stiffness	(5)
	c)	Differentiate between Soldering and brazing.	(4)
	d)	Name and explain any four operations on lathe.	(5)
8	a)	How engineering materials are classified. Give two examples for each.	(5)
	b)	List any four destructive material testing methods and explain their purpose.	(6)
	c)	What is extrusion? Explain different types of extrusion processes.	(5)
	d)	List the advantages of CNC machining over conventional machining.	(4)
9	a)	What are ceramics and composites?Give examples for each and their uses.	(6)
	b)	Draw the stress-strain diagram for mild steel and mark the salient points.	(4)
	c)	With neat sketch explain any four types of forging operations.	(6)
	d)	Differentiate between operations done in planer and shaper machines.	(4)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICALENGINEERING SCIENCES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two questions, each carries 15 marks. Marks

1	a)	Give the two statements of second law of thermodynamics and show their equivalence.	(6)
	b)	Explain the working of a reaction steam turbine with a neat sketch.	(5)
	c)	Write a short note about the qualitative ideas on entropy.	(4)
2	a)	State the zeroth law of thermodynamics. What is its physical significance?	(4)
	b)	Distinguish between the terms heat engine, heat pump and refrigerator.	(5)
	c)	Explain the working of a four stroke CI engine with suitable sketches.	(6)
3	a)	Mention any fourmilestones in Indian space program.	(4)
	b)	Explain the working of gas turbines.	(5)
	(c)	Explain the following: i)Principle of increase of entropy ii) Irreversibility iii) Available energy	(6)

PART B

Answer any two questions, each carries 15 marks.

4	a)	List any six applications of refrigeration.	(6)
	b)	Explain the working of a split air conditioning system with a suitable sketch.	(5)
	(c)	Mention the names any four vehicle manufactures in India along with their popular makes	(4)
5	a)	Explain the following terms with respect to psychrometry i)WBT ii) Relative humidity iii) Dew point temperature	(6)
	b)	List the major components of an automobile. Also explain their individual functions.	(9)
6	a)	How do we use refrigeration for the purpose of food preservation?	(4)
	b)	Explain any three different types of jet engines mentioning their applications.	(6)
	c)	Write a short note about aerodynamics.	(5)

PART C

Answer any two questions, each carries 20 marks.

7	a)	Explain about the mechanical properties of common engineering materials.	(7)
	b)	What are CNC machines? What are their applications?	(7)
	c)	Differentiate between following manufacturing methods: i)Casting ii) Forging iii) Rolling	(6)
8	a)	What are alloys? List any five alloys with their composition.	(6)
	b)	Distinguish between BCC, FCC and HCP crystal structures.	(6)
	c)	How do soldering process differ from brazing?	(4)
	d)	What is grinding process in machining?	(4)
9	a)	Explain any four methods for testing engineering materials.	(8)
	b)	What is a welding process? Explain any three welding techniques.	(7)
	c)	Give few examples for the typical products produced by the following processes: i) Forging ii) Extrusion iii) Turning iv) Milling v) Drilling	(5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JULY 2018

Course Code: BE10102

Course Name: INTRODUCTION TO MECHANICALENGINEERING SCIENCES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two complete questions, each carries 15 marks Marks

1	a)	Describe the different systems in thermodynamics. Give one example for each.	(6)
	b)	Explain the concept of available energy and increase of entropy principle.	(6)
	c)	Give three important achievements in Indian space programme.	(3)
2	a)	With neat sketch explain the working of a two-stroke Diesel engine.	(7)
	b)	Give very important land marks in the history of power production.	(3)
	c)	Explain the working principle of centrifugal compressor.	(5)
3	a)	Write statements of second law of thermodynamics.	(5)
	b)	Give the limitation of first law of thermodynamics.	(4)
	c)	Give the working principles of impulse and reaction hydraulic turbines.	(6)

PART B

Answer any two complete questions, each carries 15 marks

4	a)	Differentiate between refrigeration and air-conditioning.	(4)
	b)	Give two demerits of window air conditioner and two merits of split air conditioner.	(4)
	c)	Draw and explain the power transmission from engine to wheels in a four-wheel drive, also explain the function of gear box and differential.	(7)
5	a)	Explain four important factors controlling human comfort.	(5)
	b)	Give applications of refrigeration in chemical and process industries.	(6)
	c)	Write a short note about psychometric properties of air.	(4)
6	a)	With a schematic diagram, explain the air-conditioning system for a cinema theatre in Kerala during summer season.	(7)
	b)	Give three important land marks in the world history of automobiles and two important land marks in the history of Indian automobiles.	(5)
	c)	Explain drag and lift in aerodynamics.	(3)

PART C

Answer any twocomplete questions, each carries 20 marks

7	a)	Name the common alloys used for human needs and mention at least two uses of each.	(8)
	b)	Explain the term CNC. Give two merits and two demerits of CNC.	(4)
	c)	Mention the significance of testing of engineering materials.	(3)
	d)	Name two operations on lathe, two operations on milling machine and one operation on shaping machine.	(5)
8	a)	Explain common crystal structures in metals with neat sketches.	(9)
	b)	Differentiate casting and forging. Give three products manufactured by casting and forging.	(7)
	c)	Differentiate between welding and brazing. Give two applications of the same.	(4)
9	a)	Explain different composites and its uses in engineering.	(9)
	b)	Explain extrusionname the metals used for extrusion. give two products manufactured by extrusion.	(6)
	c)	Draw the figure of a milling machine and mark the important parts.	(5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICALENGINEERING SCIENCES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two questions, each carries 15 marks. Marks

1	a)	Define entropy. What happens to entropy of an isolated system during irreversible process and reversible process?	(5)
	b)	An inventor claims to have developed an engine that works between 500 degree Celsius and 30 degree Celsius with an efficiency of 68%. Is this claim true? Justify your answer.	(6)
	c)	Differentiate between enthalpy and internal energy.	(4)
2	a)	Explain the working of reciprocating air compressor with neat sketch.	(8)
	b)	Describe the working of reaction type steam turbine.	(7)
3	a)	Discuss the recent space programs of ISRO.	(5)
	b)	Differentiate between solid propellant rockets and liquid propellant rocked.	(5)
	c)	Compare SI and CI engines.	(5)

PART B

Answer any two questions, each carries 15 marks.

4	a)	Describe the working of vapour compression refrigeration system with line diagram. Also show the processes on P-h and T-S coordinates.	(10)
	b)	Draw and explain the fuel system of a diesel engine.	(5)
5	a)	With a neat sketch explain the working of window air conditioning system.	(10)
	b)	Draw a single plate clutch and mark different parts on it.	(5)
6	a)	Explain the working of turboprop engine with line diagram.	(9)
	b)	Differentiate between comfort air-conditioning with industrial air-conditioning.	(6)

PART C

Answer any two questions, each carries 20 marks.

7	a)	Define the following terms associated with crystallography i. Space lattice ii. Unit cell iii. Coordination number iv. Atomic packing factor.	(10)
	b)	Discuss the following mechanical properties of the material i. Ductility ii. Brittleness iii. Hardness iv. Malleability v. Creep	(10)
8	a)	With a neat sketch explain the working of a shaper machine.	(10)
	b)	Explain arc welding process with schematic diagram.	(10)
9	a)	Illustrate the properties of composites and ceramics with reference to the relevant fields of application.	(10)
	b)	Draw a neat diagram of a lathe and label its parts.	(10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICALENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two questions, each carries 15 marks. Marks

1	a)	Explain the working of Carnot cycle with relevant P-V and T-S diagrams. Give the limitations of Carnot Engine.	(10)
	b)	State Zeroth law of thermodynamics and its significance.	(5)
2	a)	Give the classifications of hydraulic turbines. Also describe the method of selection of hydraulic turbines for various applications.	(7)
	b)	Explain with sketch the working of solid propellant rockets. Write two merits and demerits of them.	(8)
3	a)	Write any five milestones in the historical development of steam engines.	(5)
	b)	Explain with sketches the working of open cycle and closed cycle gas turbines with P-V diagram.	(10)

PART B

Answer any two questions, each carries 15 marks.

4	a)	Give the significance of psychrometric chart. Draw a psychrometric chart and show sensible cooling and dehumidification processes on it.	(8)
	b)	Draw and explain a suitable summer air–conditioning system for coastal area.	(7)
5	a)	With sketches describe lift, drag, and thrust in aerodynamics.	(7)
	b)	Draw the block diagram representing the power line from engine to wheel on rear wheel drive vehicle. Give also the role of differential in it.	(8)
6	a)	Explain the history and development of automobile in the world.	(7)
	b)	Explain the working of domestic refrigerator with the help of neat diagram.	(8)

PART C

Answer any two questions, each carries 20 marks.

7	a)	How many types of space lattices are found in metals? Explain the principal lattices with their number of atoms.	(10)
	b)	Discuss the properties and engineering applications of bearing alloys and composites.	(10)
8	a)	Differentiate between up milling and down milling processes with sketches.	(10)

	b)	Differentiate between shaper and planer. Draw a line diagram of a shaper and mark its parts.	(10)
9	a)	Describe any three taper turning processes with sketches.	(10)
	b)	Suggest a method for grinding of cylindrical surfaces. Explain the process with a neat diagram.	(10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two questions, each carries 15 marks. Marks

1	a)	Explain the following terms i. Intensive property ii. Extensive property. iii. System iv. Control volume	(8)
	b)	State and explain the two classical statements of second law of thermodynamics along with applications.	(7)
2	a)	State the principle of increase of entropy and give its significance.	(5)
	b)	Explain the working of Francis turbine with sketch. Also specify the role of draft tube in a reaction turbine.	(10)
3	a)	Discuss the working of petrol engine that produces power during every single revolution of crank shaft with sketches.	(8)
	b)	Explain liquid propellant rockets. Write the merits and demerits of it.	(7)

PART B

Answer any two questions, each carries 15 marks.

4	a)	Write any four industrial applications of refrigeration.	(4)
	b)	Mention the factors controlling human comfort in air conditioning.	(4)
	c)	Describe the desirable properties of a good refrigerant.	(7)
5	a)	Draw aircraft wing and show aerodynamic forces.	(5)
	b)	Explain with neat sketch the working of turbojet engine.	(10)
6	a)	Discuss the classification of automobiles with suitable examples.	(8)
	b)	Explain the working of simple carburettor with diagram.	(7)

PART C

Answer any two questions, each carries 20 marks.

7	a)	Explain the processes of welding, brazing and soldering and mention their fields of application.	(10)
	b)	Suggest a method for grinding of plain surfaces. Explain the process with a neat diagram.	(10)
8	a)	Describe the properties of metals and alloys with reference to the relevant fields of application.	(10)

b) Explain the different destructive testing methods employed for engineering materials (10)

9 a) Explain forward extrusion and backward extrusion with sketches. Also mention its applications. (10)

b) Discuss the types, properties and applications of polymers in engineering field. (10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech degree examinations (S), September 2020 (S1/S2 - 2015 Scheme)

Course Code: BE101-02

Course Name: INTRODUCTION TO MECHANICALENGINEERING SCIENCES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two questions, each carries 15 marks. Marks

1 a) Differentiate between heat and work. (5)

b) Explain the terms availability and irreversibility. (5)

c) Calculate the amount of work done on air when 7 m^3 of air at a pressure of 3 bar and at a temperature of 25^oC is compressed isothermally to a pressure of 12 bar. (5)

2 a) Explain the working of a rotary compressor. (5)

b) Explain the working of Pelton turbine in a hydraulic power plant with a neat diagram. (10)

3 a) Explain the thermodynamic equilibrium of a system. (6)

b) Define specific speed of a turbine and explain how turbines are classified based on specific speeds. (5)

c) Illustrate the functions of draft tube. (4)

PART B

Answer any two questions, each carries 15 marks.

4 a) Compare vapour compression and vapour absorption refrigeration systems. (6)

b) Define COP of a refrigerator. Give the commercial specifications of a refrigerator and air conditioner. (4)

c) Draw a neat diagram of window air conditioning system and label its parts. (5)

5 a) With a neat sketch explain the functions of power transmission elements in automobiles. (8)

b) Explain the working of turbofan engine used in an aircraft. (7)

6 a) Define the terms WBT, Specific Humidity, Dew point temperature and Relative humidity. Also draw the psychrometric chart. (10)

b) Draw a diesel fuel pump. (5)

PART C

Answer any two questions, each carries 20 marks.

7	a)	Define the following mechanical properties of engineering materials i. Toughness ii. Hardness iii. Creep iv. Fatigue v. Malleability	(10)
	b)	Draw BCC, FCC and HCP unit cells. Also find the atomic packing factor of each one.	(10)
8	a)	Explain the different types of forging and rolling operations with reference to engineering applications.	(10)
	b)	Explain the moulding process in casting with a sketch showing all the parts.	(10)
9	a)	Explain a CNC machine with block diagram. Also give the significance of CNC machine in modern manufacturing scenario.	(10)
	b)	Discuss the types, properties and applications of ceramics and composites in engineering field.	(10)

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