

Theme	Course	Cr.Hrs.
Theme 1: Engineering Mechanics and Materials	Engineering Materials (I&II)	6
	Strength of Materials (I&II)	6
Theme 2: Engineering Thermo-Fluid System	Fluid Mechanics	3
	Heat Transfer	3
	Refrigeration and Air Conditioning	3
	Engineering Thermodynamics (I&II)	6
Theme 3: Control Engineering	Instrumentation and Measurements	3
	Introduction to Mechatronics	3
Theme 4: Machinery Design and Energy Conversion	IC Engine and Reciprocating Machines	3
	Machine Elements (I&II)	6
	Turbomachinery	3
	Mechanism of Machinery	3
	Materials Handling and Equipment	3
Theme 5: Manufacturing, Maintenance and Industrial Management	Manufacturing Engineering (I&II)	6
	Maintenance of Machinery	3
	Industrial Management and Engineering Economy	3
	Total	63

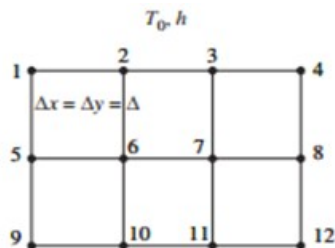
No. of items/Questions
12
11
6
6
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11
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6
120

question

opt1

Which of the following microscope are not used for microscopy?	Optical
Co-ordination number of a crystalline solid is	Number of particles in the unit cell
Burger vectors are relevant to which of the following crystalline defects?	Point defects
As the temperature rises, the rate of vacancy diffusion in metals	increases
In terms of which of the following properties, metals are better than ceramics?	Hardness
necking occurs in which of the following fractures?	Ductile fractures
What is the eutectic composition in the final structure of steel increases the strength of steel?	$D(0.15\% C) + \delta(0.09\% C) \rightarrow \gamma(0.17\% C)$
Which of the following is/are the components of brass alloy?	Martensite
Which of the following processes will one use on hardened steel to reduce brittleness?	Copper & Tin
Which of the following element is added to steel to form stainless steel?	Annealing
Which of the following metal highly prone to corrosion?	Chromium
When a structural member is subjected to which type of loading causes a structural member to undergo shape distortion?	Aluminum
Which of the following is not a factor that affects the strength of a structural member?	Shear stress
The deformation of a structural member is directly proportional to	Axial Load
Of the following is a measure of how much it deforms?	Material properties
What are principal stresses?	The applied load and the modulus of elasticity of the material
Which of the following is an example of an energy method for solving deflection problems?	Stress
work?	Stresses that act perpendicular to each other
indeterminate beam?	Method of joints
non-symmetric cross section in a beam?	forces
cross section?	Moment distribution method
which one of the following statements is not correct?	section does not.
which one of the following statements is correct?	It does not affect the cross section.
velocity of 10 m/s flows through a pipe with a diameter of 0.1 m. What is the mass flow rate?	a confined fluid is transmitted in all irregular and chaotic movement of fluid particles characterizes the laminar flow
m. If the full-scale pump has an impeller	3.14 kg/s
what is the difference between skin friction drag and pressure drag?	1000 L/s
calculate the head loss in a pipe due to	viscosity at the surface of an object, while pressure drag is caused by pressure
one-dimensional steady-state heat conduction	Bernoulli's equation
best choice as an insulating layer in a composite wall for minimizing heat transfer through the	The temperature distribution is a function of time and position
A composite wall consists of two layers with	Aluminum (thermal conductivity = 200
underlying natural convection heat transfer?	$q = (T_2 - T_1) / [(L_1/k_1) + (L_2/k_2)]$
135 degree Celsius. Find local heat transfer	Heat transfer occurs due to molecular
	5.83 W/m ² K

Air at T_0 acts on top surface of the rectangular solids as shown with a convection heat transfer coefficient of h . The correct steady-state finite-difference heat conduction equation for node 3 of this solid is:



$$T_3 = [(k/2\Delta)(T_2 + T_4 + T_7) + hT_0] / [(k/\Delta) + h]$$

removed by
design of an HVAC system
what is subcooling in a vapor-compression
refrigeration system?
kJ/kg. what is the Cooling effect of system
calculation in air-conditioning design?

Refrigeration effect
of the building
vapor after all liquid has been boiled
249.7 KJ/Kg
system

what is the definition of work in thermodynamics?	pressure difference
expression for the First Law of	$dU = dQ/dW$
which of the following situations violates the law of conservation of energy?	temperature sink
which of the following statements is true about the Second Law of Thermodynamics?	always decreases over time
about the Carnot cycle and its efficiency in	always higher than that of a Carnot cycle
which of the following is an example of a process that decreases entropy?	The diffusion of a gas into a vacuum
what is meant by irreversibility in thermodynamics?	surroundings
What is the ideal gas law in thermodynamics?	the gas constant, and T is temperature
heating value (LHV) and the higher heating	includes it
What is a Rankine cycle in thermodynamics?	gas turbine engine
which of the following is an example of a refrigeration cycle?	engine
Which of the following is an input transducer?	Temperature sensor
which of the following is an example of a temperature transducer with high accuracy?	Thermocouple
in which of the following applications is a flow meter commonly used?	Engine testing
to increase the accuracy of an experimental	Increasing the frequency of data sampling
what is the purpose of calibration in instrumentation systems?	measurement system
what is the purpose of modeling common systems in mechanical engineering?	different conditions
in the context of system modeling, what is meant by the term transfer function?	change in input
what is the purpose of signal conditioning in an instrumentation system?	format
input transducer used in controlling the speed	Tachometer
using a pneumatic actuator in a mechanical	High precision
using a simple passive circuit to control a	Resistant to impact and vibration
what is the main difference between a petrol engine and a diesel engine?	diesel engine works on Diesel cycle

which of the following processes is most efficient in converting heat into work?	Carnot cycle
component is generally responsible for removing excess heat generated during	Cooling jacket
which of the following factors can lead to increased engine wear?	High oil viscosity
which of the following is not an example of an engine management system component?	Fuel pump
typically produced by an internal combustion	Nitrogen oxides (NOx)
what is the difference between stress and strain?	while strain is the resulting deformation.
What is fatigue failure?	the material to fracture
which of the following materials has the highest modulus of elasticity?	Rubber
what type of stress-strain curve does a brittle material like ceramic exhibit?	A linear curve
What is stress concentration?	due to mechanical stress
what is the primary cause of fatigue failure in materials?	fracture
based on the principle that failure occurs when the maximum shear stress in the material	Maximum normal stress theory
suitable for a non-permanent joint that must	Welded joint
suited for applications where a constant force	Torsion spring
which of the following materials is commonly used for high pressure vessels?	Aluminum
best suited for transmitting power between two	Shaft
which of the following is not a type of turbo machine?	Turbine
What principle of operation do all turbo machines rely on?	The Venturi Effect
which of the following is not a type of energy loss in turbo machines?	Frictional Loss
which of the following is not an efficiency of a turbo machine?	Isentropic Efficiency
which of the following is not a performance characteristic of a turbo machine?	Pressure Ratio
which of the following is not a significance of the specific speed in pump design?	It predicts the flow rate of the pump
commonly used in internal combustion	Four-bar linkage
what is the main difference between forward and inverse kinematics in robotics?	effector.
applying computer methods for kinematic and how does the gear ratio of a system affect the output speed and torque?	methods torque.
removing weight from a rotating part until its mass is evenly distributed and the vibration is	Static balancing
long distances in a warehouse or distribution ce	Conveyor systems
for lifting load in a very short distance?	Conveyors
selecting material handling equipment?	Production volume
selecting automated material handling equipment?	Integration with existing production systems
designing a hoist or conveyor system?	The distance the material needs to be transp
conveying equipment?	Implementing the system
Selecting a Production Metal with Casting	part under tension.
one of the following is not correctly matched of casting defects with its remedies?	Suitably adjust pouring temperature.
which one is factors not influencing the results of a bearing process?	elasticity, and ductility.
what are the advantages of the deep drawing process in manufacturing?	Cost-effective
How can simulation software be used to optimize machine?	rate
associated with glass-forming processing, but which methods are used to evaluate the quality	specialized equipment to melt and form.
and performance of powder metallurgy parts?	Microstructural analysis
optimizing tool wear/life, cutting force and	geometries of cutting tools

What are the most commonly used types of additive manufacturing technologies?	Fused Deposition Modeling (FDM)
What is not the advantages of using mechanical fasteners for assembly?	common hand or power tools.
What impact the strength and ductility of the welded joint?	Matching material properties
What is Condition-Based Maintenance (CBM)?	scheduled intervals
What is the primary goal of Preventive Maintenance (PM) in an industrial setting?	To repair equipment only when it fails
What is the most common type of damage observed in rotating machinery?	Dents and scratches
What is the primary goal of Reliability-Centered Maintenance (RCM)?	Reliability
What is the primary role of a maintenance planner in a maintenance management system?	Scheduling routine maintenance activities
What is a typical time interval for routine maintenance tasks?	years
What is the primary purpose of a maintenance strategy?	Organising
What is the primary purpose of a maintenance plan?	Technical
What is the primary purpose of a maintenance schedule?	Product layout
What is the primary purpose of a maintenance procedure?	Functional layout
What is the primary purpose of a maintenance record?	Provide the lowest inventory investment
What is the primary purpose of a maintenance report?	Manpower

opt2

opt3

Electron	Ultrasonic
Number of nearest neighbors of a particle	Number of octahedral voids in a unit cell
B Line defects	Interfacial defects
decreases	remains the same
Ductility	Toughness
Brill fracture $\gamma(2.1\% \text{ C}) + \text{Fe}_3\text{C}$	Ferrite $\gamma(0.025\% \text{ C}) \rightarrow \alpha(0.025\% \text{ C}) + \text{Fe}_3\text{C}(6.67\% \text{ C})$
Pearlite	Ledeburite
Copper & Aluminum	Copper & Iron
Normalizing	Spheroidizing
Copper	Boron
Copper	Iron
Bending stress	Tensile stress
Torsion	Shear Load
Cross-sectional area	Length of the member
The applied load and the length of the member	The cross-sectional area and the length of the member
Strain	Modulus of elasticity
The maximum and minimum stresses in a material	Stresses that are equal in magnitude but act in opposite directions
Method of sections	Moment-area method
distributed	is the same at every point
Differential equation method	Virtual work method
section has a flat shape.	section.
It causes the cross section to warp.	torsional force.
now states that the mass flow rate of a fluid is constant across	density of a fluid to the density of a
system to change the temperature	Low fluid pressures can lead to cavitation in a fluid system
7.85 kg/s	31.4 kg/s
2000 L/s	3000 L/s
object, while pressure drag is	turbulence, while pressure drag is caused by boundary layer
Darcy-Weisbach equation	Reynolds number equation
function of time only	The temperature distribution is a function of position only
Copper (thermal conductivity = 400	Glass wool (thermal conductivity =
$q = (T_2 - T_1) / [(L_1/k_2) + (L_2/k_1)]$	$q = (T_2 - T_1) / [(L_1 + L_2)/(k_1 + k_2)]$
Heat transfer occurs through the bulk	Heat transfer occurs due to thermal
6. 83 W/m ² K	7. 83 W/m ² K

$T3 = [(k/2\Delta)(T2+ T4+ 2T7)+ hT0] / [(2k/\Delta)+ h]$	$T3 = [(k/\Delta)(T2+ T4)+ hT0] / [(2k/\Delta)+ h]$
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heating load
Determine the design heating
and cooling loads
a saturated liquid before boiling
145.9 kJ/kg
capacity of the system

cooling load
Select the appropriate system
saturated liquid before boiling
1245.0KJ/Kg
refrigerant and other components

pressure	phase transition
$dQ = dU - dW$	$dU = dW + dQ$
generate electricity	expelling it to the exterior
efficiency of any heat engine	processes
a Carnot cycle	Carnot cycle
in a container	piston-cylinder system
surroundings	entropy
gas constant, and T is temperature	constant, and T is temperature
while HHV does not	while HHV does not
of a refrigeration system	plant
The Carnot cycle in a heat engine	turbine power plant
Strain gauge	transformer (LVDT)
(RTD)	Thermistor
Temperature monitoring	Material testing
sampling	Reducing the number of data points
measurement system	the measurement system
system design	systems
power in a system	input
interference in the input signal	improve sensitivity
Load cell	Thermocouple
Low noise	High speed
High complexity	Too much energy loss
compression ignition.	in size compared to diesel engine

Otto cycle	Rankine cycle
Radiator	Exhaust pipe
Low oil temperature	Insufficient oil pressure
Mass airflow sensor	Exhaust manifold
Carbon monoxide (CO)	Sulfur dioxide (SO ₂)
force.	deformation
strong enough for the load applied	the material
Steel	Aluminum
yield point	pronounced yield point
material due to mechanical stress	material due to temperature changes
for load applied	below yield strength of material
Maximum shear stress theory	Coulomb-Mohr theory
Riveted joint	Threaded joint
Compression spring	Extension spring
Carbon Steel	Copper
Gear	Belt
Compressor	Pump
The Bernoulli Principle	The Joule-Thomson Effect
Viscous Loss	Shock Loss
Mechanical efficiency	Hydraulic efficiency
Flow Rate	Power Output
It predicts the head of the pump	it predicts the shape of the impeller
Slider-crank linkage	Cam and follower linkage
for a desired end-effector position.	is used for obstacle avoidance.
mechanism	data
and a decrease in torque.	and an increase in torque.
Dynamic balancing	Resonance testing
Pallet trucks	Reach trucks
Cranes	Jacks
Weight and size of materials	Environmental conditions
requirements	Cost of implementation
The weight and size of the material	The environmental conditions
efficiency	system
required part.	Provision of Fillet Radius.
defective molding boxes.	lower pouring temperature.
how cleanly they shear it.	produced quickly and efficiently.
High production rates	tight tolerances.
Testing different scenarios:	wear:
performance.	parts.
behavior	defects
Tool Wear Monitoring	friendly

Stereolithography (SLA)	Selective Laser Sintering (SLS)
vibrations.	assemblies
Changing the joint properties	Maintaining integrity of the joint
fail	the condition of the equipment
To maximize uptime of equipment	To replace equipment before it fails
Corrosion	Fractures and cracks
Maintainability	Availability
Performing equipment repairs	maintenance tasks
Cleaning the motor once a year	10 years
Staffing	Planning
Administrative	Interpersonal
Process layout	Fixed position layout
Batch production layout	Straight line layout
Provide little customer service	Provide high production costs
Machinery	Materials

opt4

opt5

answer

Scanning probe
Number of tetrahedral voids in a unit cell
Bulk defects
may increase or decrease
Yield Strength
It doesn't occur during fracture
$L(0.53\% C) + \delta(0.09\% C) \rightarrow \gamma(0.8\% C)$
Austenite
Copper and Zinc
Tempering
Titanium
Zinc
Compressive stress
Bending
Temperature
The modulus of elasticity of the material and the length of the member
Poisson's Ratio
Stresses that act at an angle of 45 degrees to the applied load
Method of virtual work
perfectly elastic materials
All of the above
than a symmetric cross section.
direction parallel to the torsional force.
pressure, velocity, and height in a fluid in
The viscosity of a fluid refers to its resistance to shear stress
78.5 kg/s
4000 L/s
separation, while pressure drag is caused by
Poiseuille's equation
The temperature distribution is a constant
Steel (thermal conductivity = 50 W/(m·K))
$q = (T_2 - T_1) / [(L_1/k_1) + (L_2/k_1)]$
Heat transfer occurs due to conduction within the
8. 83 W/m ² K

|opt3

opt2

opt2

opt1

opt2

opt1

opt3

opt1

opt4

opt4

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opt4

|opt3

opt4

opt4

opt1

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opt4

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|opt3

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opt4

opt1

opt1

opt2

|opt3

opt3

opt1

opt2

opt1

$$T_3 = [(k/\Delta)(T_2 + T_4 + T_7) + hT_0] / [(k/\Delta) + h]$$

All of the above.

vapor after all liquid has been boiled away.

10 KJ/Kg

pressure drop

as a result of heat transfer

$dW = dU - dQ$

of energy

Thermodynamics

unrelated to that of a Carnot cycle

The combustion of a fuel in an engine

energy and decrease in entropy

and T is temperature

while HHV is applicable for all types of fuels

engine

refrigerator

Pressure transducer

Infrared sensor

Noise measurement

Increasing the size of the measuring instrument

system

systems

from a system

instrumentation system

Pressure transducer

High power density

Limited control options

None of the above.

opt2

opt3

opt2

opt2

opt2

opt2

opt1

opt3

opt4

opt2

opt2

opt3

opt3

opt1

opt1

opt3

opt4

opt1

opt2

opt1

opt1

opt1

opt1

opt1

opt2

opt1

opt3

opt1

opt2

Diesel cycle
Pistons
All of the above.
Throttle body
Hydrocarbons (HC)
used to describe deformation in an object.
material to weaken
Wood
fracture point
temperature changes
environment
Modified Mohr theory
Adhesive joint
Belleville washer spring
Titanium
Bearing
Heat exchanger
The Coriolis Effect
Kinetic Energy Loss
Thermal Efficiency
Temprature ratio
It determines the efficiency of the pump
Gear linkages
offline analysis.
mechanics
or torque.
Modal analysis
Hand trucks
attachments
All of the above
All of the above
All of the above
inspections
Avoid abrupt changes in the cross-section.
Provide hard ramming.
can lead to optimal results.
used
Optimization of cutting parameters
size and shape.
Quality Standards
Tool Coatings

opt1
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 opt3

Electric Discharge Machining (EDM)
and weight of the assembly.
Surface preparation
components on a regular schedule
personnel needed
Wear and tear
Durability
Conducting equipment inspections
Rebuilding the motor every 2 years
Controlling
Organizational
Combination layout
Both (A) and (B)
Provide the highest distribution costs
All of the above.

All Except 'D'

opt4
opt4
opt5
|opt3
opt2
opt4
opt1
opt1
opt2
|opt3
opt1
opt1
opt4
opt1
opt4

question

opt1

Which of the following microscope are not used for microscopy?	Optical
Co-ordination number of a crystalline solid is	Number of particles in the unit cell
Burger vectors are relevant to which of the following crystalline defects?	Point defects
As the temperature rises, the rate of vacancy diffusion in metals	increases
Of the following properties, metals are better than ceramics?	Hardness
Necking occurs in which of the following fractures?	Ductile fractures
Which of the following material in the final structure of steel increases the strength of steel?	$\delta(0.09\% \text{ C}) \rightarrow \gamma(0.17\% \text{ C})$ C)
Which of the following is/are the components of a brass alloy?	Martensite
Which of the following processes will one use on hardened steel to reduce brittleness?	Copper & Tin
Which of the following element is added to steel to form stainless steel?	Annealing
Which of the following metal highly prone to corrosion?	Chromium
	Aluminum

opt2	opt3	opt4	opt5
Electron microscope Number of nearest neighbors of a particle	Ultrasonic Number of octahedral voids in a unit cell	Scanning probe Number of voids in a unit cell	
B Line defects decreases	Interfacial defects remains the same	Bulk defects Bulk defects increase or decrease	
Ductility	Toughness	Yield Strength It doesn't change	
Brittle fracture γ (2.1 % C) + Fe ₃ C (6.67% C)	Fatigue γ (0.8 % C) $\rightarrow$ α (0.025% C) + Fe ₃ C (6.67% C)	Brittle fracture γ (0.8 % C)	
Pearlite	Ledeburite	Austenite	
Copper & Aluminum	Copper & Iron	Copper and Zinc	
Normalizing	Spheroidizing	Tempering	
Copper	Boron	Titanium	
Copper	Iron	Zinc	

answer

|opt3

opt2

opt2

opt1

opt2

opt1

opt3

opt1

opt4

opt4

opt1

opt4

question	opt1	opt2
When a structural member is subjected to which type of loading causes a structural member to undergo shape distortion?	Shear stress	Bending stress
Which of the following is not a factor that affects the strength of a structural member?	Axial Load	Torsion
The deformation of a structural member is directly proportional to	Material properties	Cross-sectional area
of the following is a measure of how much it deforms?	The applied load and the modulus of elasticity of the material	The applied load and the length of the member
What are principal stresses?	Stress	Strain
Which of the following is an example of an energy method for solving deflection problems?	Stresses that act perpendicular to each other	The maximum and minimum stresses in a material
What is the principle behind the method of virtual work?	Method of joints	Method of sections
work for the deflection of a statically indeterminate beam?	equal to the virtual work done by internal forces	The load on the structure is evenly distributed
What is the difference between a symmetric and non-symmetric cross section in a beam?	Moment distribution method	Differential equation method
What is the effect of torsion on a non-circular cross section?	centerline, while a non-symmetric cross section does not.	symmetric cross section has a flat shape.
	It does not affect the cross section.	It causes the cross section to warp.

opt3	opt4	opt5
Tensile stress	Compressive stress	
Shear Load	Bending	
Length of the member the cross-sectional area and the length of the member	Temperature material and the length of the member	
Modulus of elasticity magnitude but act in opposite directions	Poissons Ratio angle of 45 degrees to the applied load	
Moment-area method structure is the same at every point	Method of virtual work perfectly elastic materials	
Virtual work method always stronger than a non- symmetric cross section. perpendicular to the torsional force.	All of the above symmetric cross section the direction parallel to the torsional force.	

- answer
- opt3
 - opt4
 - opt4
 - opt1
 - opt2
 - opt2
 - opt3
 - opt1
 - opt4
 - opt1
 - opt4

question	opt1	opt2
Which one of the following statements is not correct?	Pascal's law states that pressure applied to a confined fluid is transmitted in all directions equally.	The continuity equation for fluid flow states that the mass flow rate of a fluid is constant across different sections of a pipe.
Which one of the following statements is correct?	Irregular and chaotic movement of fluid particles characterizes the laminar flow.	The purpose of a pump in a fluid system to change the temperature of the fluid.
Velocity of 10 m/s flows through a pipe with a diameter of 0.1 m. What is the mass flow rate?	3.14 kg/s	785 kg/s
If the full-scale pump has an impeller diameter of 2 m, what is the flow rate of water?	1000 L/s	3000 L/s
What is the difference between skin friction drag and pressure drag?	viscosity at the surface of an object, while pressure drag is caused by pressure	pressure differences around an object, while pressure drag is caused by the fluid viscosity at the surface
Which of the following is an equation used to calculate the head loss in a pipe due to friction?	Bernoulli's equation	Darcy-Weisbach equation

opt3

opt4

opt5

Specific density is the ratio of the density of a fluid to the density of a reference.	Bernoulli's equation is the equation that relates pressure, velocity, and height in a fluid in motion.
Low fluid pressures can lead to cavitation in a fluid system.	The viscosity of a fluid refers to its resistance to shear
31.4 kg/s	78.5 kg/s
3000 L/s	4000 L/s
turbulence, while pressure drag is caused by boundary	boundary layer separation, while pressure drag is caused
Reynolds number equation	Poiseuille's equation

answer

opt3

opt3

opt4

opt1

opt1

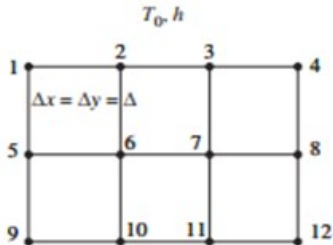
opt2

question

Which of the following statements is true for one-dimensional steady-state heat conduction problems?
Which of the following materials would be the best choice as an insulating layer in a composite wall for minimizing heat transfer through the wall?
Which of the following is a fundamental principle underlying natural convection?
A plate with a velocity 4.5 m/s. Let the plate is heated to a surface temperature of 135 degree Celsius. Find local heat transfer coefficient from the leading edge at a distance of 0.5 m.
Four rectangular solids as shown with a convection heat transfer coefficient of h. The correct steady-state finite-difference heat conduction equation for node 3 of this solid is:

opt1

The temperature distribution is a function of time and position
Aluminum (thermal conductivity = 200 W/m-K)
 $q = (T_2 - T_1) / [(L_1/k_1) + (L_2/k_2)]$
Heat transfer occurs due to molecular collisions within the fluid.
5.85 W/m² K



$$T_3 = [(k/2\Delta)(T_2 + T_4 + T_7) + hT_0] / [(k/\Delta) + h]$$

opt2	opt3	opt4	opt5
The temperature distribution is a function of time only	The temperature distribution is a function of position only	The temperature distribution is a constant	
Copper (thermal conductivity = 400 W/m-K)	Glass wool (thermal conductivity = 0.04 W/m-K)	Steel (thermal conductivity = 50 W/m-K)	
$q = (T_2 - T_1) / [(L_1/k_2) + (L_2/k_1)]$	$q = (T_2 - T_1) / [(L_1 + L_2)/(k_1 + k_2)]$	$q = (T_2 - T_1) / [(L_1/k_1) + (L_2/k_1)]$	
Heat transfer occurs through the bulk motion of the fluid.	Heat transfer occurs due to thermal radiation within the fluid.	Heat transfer occurs due to conduction within the solid	
8.83 W/m ² K	7.83 W/m ² K	8.83 W/m ² K	
$T_3 = [(k/2\Delta)(T_2 + T_4 + 2T_7) + hT_0] / [(2k/\Delta) + h]$	$T_3 = [(k/\Delta)(T_2 + T_4) + hT_0] / [(2k/\Delta) + h]$	$T_3 = [(k/\Delta)(T_2 + T_4 + T_7) + hT_0] / [(k/\Delta) + h]$	

answer
|opt3
opt3
opt1
opt2
opt1

opt2

question

The amount of energy that needs to be removed by

Which one is comes first in the

HVAC system per unit time is called

design of an HVAC system

What is subcooling in a vapor-compression refrigeration

leaving evaporator = 395.6 kJ/kg. what is the Cooling effect of

system?

What is the purpose of a cooling load calculation in air-

conditioning design?

and 60% relative humidity. The outdoor conditions of air

are 42°C dry bulb temperature and 21% relative humidity.

opt1

Refrigeration effect

Controlling the temperature

of the building

The amount of heat added to a saturated

vapor after all liquid has been boiled

away

to determine the energy efficiency of the

system

Sensible heating

opt2

heating load

Determine the design heating

The amount of heat removed

from a saturated liquid

before boiling begins

to determine the cooling capacity of the

system

Heating and humidifying

opt3	opt4	opt5	answer
cooling load	All of the above.		opt3
Select the appropriate equipment			opt2
The amount of heat added to a saturated liquid before boiling begins	liquid has been boiled away.		opt2
Refrigerant and other components	rate and pressure drop		opt2
Cooling and humidifying	Heating and dehumidifying		opt3

question	opt1	opt2
What is the definition of work in thermodynamics?	The energy transferred between a system and its surroundings as a result of a pressure difference	The energy stored in a system as a result of its temperature and pressure
Which of the following is the correct expression for the First Law of Thermodynamics in equation form?	$dU = dQ/dW$	$dQ = dU - dW$
Which of the following situations violates the law of conservation of energy?	A heat pump transferring heat from a low-temperature source to a high-temperature sink	A steam turbine extracting energy from high-pressure steam to generate electricity
Which of the following statements is true about the Second Law of Thermodynamics?	It states that the entropy of a system always decreases over time	It implies that there is a limit to the efficiency of any heat engine
Which of the following statements is true about the Carnot cycle and its efficiency in thermodynamics?	The efficiency of any real heat engine is always higher than that of a Carnot cycle	The efficiency of any real heat engine is always lower than that of a Carnot cycle
Which of the following is an example of a process that decreases entropy?	The diffusion of a gas into a vacuum	The mixing of two different gases in a container

What is meant by irreversibility in thermodynamics?	A process that involves the transfer of energy between a system and its surroundings	A process that can be reversed without any change to its surroundings
What is the ideal gas law in thermodynamics?	$PV = nRT$, where P is pressure, V is volume, n is the number of moles, R is the gas constant, and T is temperature	$PV = mRT$, where P is pressure, V is volume, m is the mass, R is the gas constant, and T is temperature
What is the difference between the lower heating value (LHV) and the higher heating value (HHV) of a fuel in thermodynamics?	LHV does not consider the heat of vaporization of water, while HHV includes it	LHV includes the heat of dissociation of fuel molecules, while HHV does not
What is a Rankine cycle in thermodynamics?	A cycle that describes the operation of a gas turbine engine	A cycle that describes the operation of a refrigeration system
Which of the following is an example of a refrigeration cycle?	The Otto cycle in an internal combustion engine	The Carnot cycle in a heat engine

opt3	opt4	opt5	answer
The energy required to achieve a phase transition	The energy added to or removed from a system as a result of heat transfer		opt1
$dU = dW + dQ$	$dW = dU - dQ$		opt3
A refrigerator keeping food cold by removing heat from the interior and expelling it to the exterior	All of the above obey the law of conservation of energy		opt4
It is only applicable to reversible processes	It is in direct conflict with the First Law of Thermodynamics		opt2
The efficiency of any real heat engine is the same as that of a Carnot cycle	The efficiency of any real heat engine is unrelated to that of a Carnot cycle		opt2
The compression of a gas in a piston-cylinder system	The combustion of a fuel in an engine		opt3

A process that involves the loss of available energy and increase in entropy	A process that involves the gain of available energy and decrease in entropy
$PV = NkT$, where P is pressure, V is volume, N is the number of particles, k is the Boltzmann constant, and T is temperature	$PV = \gamma RT$, where P is pressure, V is volume, γ is the specific heat ratio, R is the gas constant, and T is temperature
LHV includes the heat released by the condensation of water vapor, while HHV does not	LHV is only applicable for gaseous fuels, while HHV is applicable for all types of fuels
A cycle that represents the operation of a steam turbine power plant	A cycle that represents the operation of a diesel engine
The Rankine cycle in a steam turbine power plant	The Vapor-compression refrigeration cycle in a refrigerator

opt3

opt1

opt1

opt3

opt4

question	opt1	opt2
Which of the following is an input transducer?	Temperature sensor	Strain gauge
Which of the following is an example of a force-to-voltage transducer with high accuracy?	Thermocouple	Resistance Temperature Detector (RTD)
For which of the following applications is a flow meter commonly used?	Engine testing	Temperature monitoring
Which of the following techniques can be used to increase the accuracy of an experimental measurement?	Increasing the frequency of data sampling	Decreasing the frequency of data sampling
What is the purpose of calibration in instrumentation systems?	To improve the accuracy of the measurement system	To clean and maintain the measurement system

opt3	Linear variable differential transformer (LVDT)	opt4	Pressure transducer	opt5
	Thermistor		Infrared sensor	
	Material testing		Noise measuring	
	Reducing the number of data points		instrument	
	components of the measurement system		measurement system	

answer
|opt1
opt2
opt1
opt1
opt1

question	opt1	opt2
What is the purpose of modeling common systems in mechanical engineering?	To predict system behavior under different conditions	To identify sources of error in system design
In the context of system modeling, what is meant by the term transfer function?	The response of the system to a sudden change in input	The ratio of output power to input power in the system
Which of the following is an example of an instrumentation system?	Instrumentation system into a useful format	signal
Which of the following is an advantage of a tachometer?	Tachometer	Load cell
Which of the following is a disadvantage of a photometer?	High precision	Low noise
Using a simple passive circuit to control a mechanical system?	Resistant to impact and vibration	High complexity

opt3	To create new types of mechanical systems	opt4	mechanical systems obtained from a system	opt5
opt1	output of a system for a given input	opt1	instrumentation	
opt2	signal to improve sensitivity	opt2	Pressure	
opt3	Thermocouple	opt1	transducer	
opt4	High speed	opt3	high power	
opt5	Too much energy loss	opt1	limited control	
			options	

answer

opt1

opt1

opt2

opt1

opt3

opt1

question

What is the main difference between a petrol engine and a diesel engine?

Which of the following processes is most efficient in converting heat into work?

In an internal combustion engine, which component is generally responsible for removing excess heat generated during combustion?

Which of the following factors can lead to increased engine wear?

Which of the following is not an example of an engine management system component?

Which of the following pollutants is not typically produced by an internal combustion engine?

pet1

Petrol engine works on Otto cycle while diesel engine works on Diesel cycle

Carnot cycle

Cooling jacket

High oil viscosity

Fuel pump

Nitrogen oxides (NOx)

opt2

Ignition while diesel engine uses compression ignition.

Otto cycle

Radiator

Low oil temperature

Mass airflow sensor

Carbon monoxide (CO)

opt3 smaller in size compared to diesel engine	opt4 None of the above.	opt5
Rankine cycle	Diesel cycle	
Exhaust pipe	Pistons	
Insufficient oil pressure	All of the above.	
Exhaust manifold	Throttle body	
Sulfur dioxide (SO2)	Hydrocarbons (HC)	

answer
|opt2

opt1

opt1

opt3

opt3

opt3

question

What is the difference between stress and strain?

opt1

Stress is the force applied to an object, while strain is the resulting deformation.

opt2

Stress is the force applied to an object, while strain is the resulting deformation.

What is fatigue failure?

Failure due to a single high load causing the material to fracture

Failure due to a material not being strong enough for the load applied

Which of the following materials has the highest modulus of elasticity?

Rubber

Steel

What type of stress-strain curve does a brittle material like ceramic exhibit?

A linear curve

A nonlinear curve with a gradual yield point

What is stress concentration?

The reduction of stresses in a material due to mechanical stress

The increase of stresses in a material due to mechanical stress

What is the primary cause of fatigue failure in materials?

Single high loads causing material to fracture

Material not being strong enough for load applied

Which of the following failure theories is based on the principle that failure occurs when the maximum shear stress in the material exceeds a certain value?

Maximum normal stress theory

Maximum shear stress theory

Which of the following joint designs would be suitable for a non-permanent joint that must allow for disassembly and reassembly?

Welded joint

Riveted joint

Which of the following types of spring is best suited for applications where a constant force is required over a long range of deflection?

Torsion spring

Compression spring

Which of the following materials is commonly used for high-pressure vessels?	Aluminum	Carbon Steel
Which of the following machine elements is best suited for transmitting power between two components that are not in direct contact?	Shaft	Gear

opt3 the amount of deformation	opt4 describe deformation in an object.	opt5
Failure due to repeated application of a load below the yield strength of the material	Failure due to high temperature causing the material to weaken	
Aluminum	Wood	
A nonlinear curve with a pronounced yield point	A curve with no yield point and a sudden fracture point	
The reduction of stresses in a material due to temperature changes	The increase of stresses in a material due to temperature changes	
Repeated application of a load below yield strength of material	Corrosion or chemical reactions with environment	
Coulomb-Mohr theory	Modified Mohr theory	
Threaded joint	Adhesive joint	
Extension spring	Belleville washer spring	

answer
|opt3

opt3

opt2

opt4

opt2

opt3

opt2

opt3

opt2

Copper	Titanium
Belt	Bearing

opt2

opt3

question	opt1	opt2
Which of the following is not a type of turbo machine?	Turbine	Compresor
What principle of operation do all turbo machines rely on?	The Venturi Effect	The Bernoulli Principle
Which of the following is not a type of energy loss in turbo machines?	Frictional Loss	Viscous Loss
Which of the following is not an efficiency of a turbo machine?	Isentropic Efficiency	Mechanical efficiency
Which of the following is not a performance characteristic of a turbo machine?	Pressure Ratio	Flow Rate
Which of the following is not a significance of the specific speed in pump design?	It predicts the flow rate of the pump	It predicts the head of the pump

opt3	opt4	opt5
Pump	Heat exchanger	
The Joule-Thomson Effect	The Coriolis Effect	
Shock Loss	Kinetic Energy Loss	
Hydraulic efficiency	Thermal Efficiency	
Power Output	Temperature ratio	
It predicts the shape of the the impeller	It determines the efficiency of the pump	

answer
opt4
opt2
opt2
opt4
opt4
opt4

question	opt1	opt2
Which type of linkage mechanism is commonly used in internal combustion engines, pumps and compressors?	Four-bar linkage	Slider-crank linkage
What is the main difference between forward and inverse kinematics in robotics?	Forward kinematics requires less time and effort than other methods.	Inverse kinematics requires less time and effort than other methods.
Which of the following is an advantage of applying computer methods for kinematic and kinetic analysis of mechanisms?	It increases in both output speed and torque.	It decreases in both output speed and torque.
How does the gear ratio of a system affect the output speed and torque?	Static balancing	Dynamic balancing
What is the purpose of balancing a rotating part until its mass is evenly distributed and the vibration is reduced?		

opt3	opt4	opt5
Can and follow linkage used for obstacle avoidance.	Gear linkages for online analysis	
Allows for the analysis of real-time data.	prior knowledge of mechanics or output speed or torque.	
decrease in output speed and an increase in torque.		
Resonance testing	Modal analysis	

answer
|opt2
opt2
opt1
opt2
opt2

question	opt1
most commonly used to transport goods over long distances in a warehouse or distribution center?	Conveyor systems
Which of the following material handling equipment is ideal for lifting load in a very short distance?	Conveyors
Which of the following factors should be considered when selecting material handling equipment?	Production volume
Which of the following is an important consideration when selecting automated material handling equipment?	Integration with existing production systems
Which of the following factors should be considered when designing a hoist or conveyor system?	The distance the material needs to be transported
What is the final step in the design of hoisting and conveying equipment?	Implementing the system

opt2	opt3	opt4	opt5
Pallet trucks	Reach trucks	Hand trucks	
Cranes	Jacks	Carton clamp	
Weight and size of materials	Environmental conditions	attachments	
Energy usage and maintenance requirements	Cost of implementation	All of the above	
The weight and size of the material	The environmental conditions	All of the above	
Testing the system for safety and efficiency	use and maintenance of the system	maintenance and inspections	

answer
|opt1
opt3
opt4
opt4
opt4
opt1

Question	opt1	opt2
What are the Factors to Consider When Selecting a Production Metal with Casting Process?	part size. Provide hard ramming.	required part.
one of the following is not correctly matched with casting defects with its remedies?	Swirls, adjust pouring temperature, sheared, such as thickness, hardness, elasticity, and ductility.	Change the defective molding boxes, material and how cleanly they shear it.
Which one is factors not influencing the results of a shearing process?	Cost-effective	High production rates
What are the advantages of the deep drawing process in manufacturing?	Optimal material usage and production rate.	Testing different scenarios:
The following are some common challenges associated with glass-forming processing, but which methods are used to evaluate the quality and performance of powder metallurgy parts?	requires high temperatures and specialized equipment to melt and form.	the glass, different scenarios: its quality and performance.
What are some common strategies for optimizing tool wear/life, cutting force and power consumption in traditional machining?	Density measurement and Microstructural analysis	powder homogeneity and Sintering behavior
What are the most commonly used types of additive manufacturing technologies?	geometries of cutting tools	Monitoring
What are the main advantages of using chemical fasteners for assembly?	Fused Deposition Modeling (FDM)	Surface lithography (SLA)
How does the composition of the filler material impact the strength and ductility of the welded joint?	Can be easily installed and removed with common hand or power tools.	loads and vibrations.
	Matching material properties	Changing the joint properties

opt3

opt4

opt5

Provision of Fillet Radius.	cross section.
parts at temperature	can lead to
quickly and efficiently.	optimal results.
parts with tight tolerances.	commonly used
potential weld or	parameters and
complex shaped parts	shape.
and Surface defects	Quality Standards
severe removal and	Coatings
selective Laser Finishing	(EDM)
Suitable for both small and	weight of the
large assemblies	assembly.
Maintaining integrity of	surface
the joint	preparation

All Except 'D'

answer

opt2

opt4

opt3

opt4

opt1

opt3

opt1

opt3

opt4

opt4

opt5

question	opt1	opt2
What is Condition-Based Maintenance (CBM)?	A maintenance strategy based on scheduled intervals	Based on fixing components only when they fail
What is the primary goal of Preventive Maintenance (PM) in an industrial setting?	To repair equipment only when it fails	To maximize uptime of equipment
What is the most common type of damage observed in rotating machinery?	Dents and scratches	Corrosion
Which of the following is a key duty of the maintenance planning department?	Reliability	Maintainability
Which of the following is an example of a preventive maintenance task that should be performed on a motor?	Scheduling routine maintenance activities	Performing equipment repairs
	Replacing the motor bearings every 3 years	Cleaning the motor once a year

performed on a motor?

opt2 based on the condition of components on a opt5

the equipment	regular schedule
before it fails	personnel needed
Fractures and cracks	Wear and tear
Availability	Durability
Writing work orders for maintenance tasks	inspections
Replacing the motor windings every 10 years	motor every 2 years

answer

- opt3
- opt2
- opt4
- opt1
- opt1
- opt2

question	opt1	opt2
This function of management relating to laying down the foundation for carrying out the other processes, equipment, and potential problems of management successfully is	Organising	Staffing
From the process equipment and machines of an industry would possess what type of	Technical	Administrative
are arranged according to the sequence of	Product layout	Process layout
Process layout is also known as	Functional layout	Batch production layout
Operations of a product the layout is known as	Provide the lowest inventory investment	Provide little customer service
To get the most profit, a company should	Manpower	Machinery
Resources refers to		

opt3	opt4	opt5
Planning	Controlling	
Interpersonal	Organizational	
Fixed position layout	layout	
Straight line layout	Both (A) and (B)	
Provide high production costs	highest	
Materials	distribution costs	
	All of the above.	

answer

opt3

opt1

opt1

opt4

opt1

opt4