139 PU Ph.D Mechanical Engineering

129 PU_2016_139_E
A typical Fe_3C alloy containing greater than 0.8% C is known as:-

○ Hyper-Eutectoid steel

○ Mild steel

○ Eutectoid steel

○ Hypo-Eutectoid steel

204 PU_2016_139_E
The maximum theoretical work obtainable, when a system interacts to equilibrium with a reference environment, is called:-

○ exergy

○ entropy

○ energy

○ anergy

161 PU_2016_139_E
If the Poisson's ratio of an elastic material is 0.4, the ratio of modulus of rigidity to Young's modulus is:-

○ 0.3

○ 0.4

○ 0.35

○ 0.25

162 PU_2016_139_E
A two dimensional fluid element rotates like a rigid body. At a point within the element, the pressure is 1 unit. Radius of the Mohr's circle, characterizing the state at that point, is:-

○ 2 unit

○ 1 unit

○ 0 unit

○ 0.5 unit

157 PU_2016_139_E
The longitudinal joint in a boiler shell is usually:-

○ butt joint

○ butt joint with single cover plate

lap joint

butt joint with two cover plates

6 of 100
159 PU_2016_139_E
The key that transmits power through frictional resistance is:-

saddle key

barth key

tangent key

Kennedy key

7 of 100
150 PU_2016_139_E
The fatigue life of a part can be improved by:-

electroplating

coating

polishing

shot-peening

8 of 100
147 PU_2016_139_E
Corioli's component acts:-

along sliding surfaces

perpendicular to sliding surfaces

somewhere in between above two

unpredictable

9 of 100
202 PU_2016_139_E
A body of weight 100 N falls freely a vertical distance of 50 m. The atmospheric drag force is 0.5N. The work interaction (in J) is:-

+25

+5000

-25

-5000

10 of 100
143 PU_2016_139_E
The natural frequency of a spring mass system on earth is ω_n. The natural frequency of this system on the moon ($g_{moon} = g_{earth}/6$) is:-

0.408 ωn

○ 0.204ωn

○ ωn

○ 0.167ωn

11 of 100

209 PU_2016_139_E

A gas turbine cycle with infinitely large number of stages during compression and expansion leads to:-

○ Atkinson cycle

○ Erricson cycle

○ Stirling cycle

○ Brayton cycle

12 of 100

169 PU_2016_139_E

The load taken by a laminated spring to make it flat is called:-

○ Maximum safe load

○ bending load

○ Proof load

○ ultimate load

13 of 100

179 PU_2016_139_E

The parameters which determines the friction factor for turbulent flow in a rough pipe are air temperature of IC engine increases, efficiency will:-

○ Mach number and relative roughness

○ Froude number and relative roughness

○ Froude number and Mach number

○ Reynolds number and relative roughness

14 of 100

170 PU_2016_139_E

The dimension of surface tension is:-

○ W/m

○ N/m^2

○ J/m

○ J/m^2

15 of 100

178 PU_2016_139_E

If x is the distance measured from the leading edge of a flat plate, then laminar boundary layer thickness varies as:-

- $x^{1/2}$
- $x^{4/5}$
- x^2
- $1/x$

16 of 100
112 PU_2016_139_E
The function, $y = x^2+(250/x)$ at x = 5 attains:-

- maximum
- 1
- minimum
- none of the above

17 of 100
110 PU_2016_139_E
What is the derivative of f(x) = |x| at x=0?

- -1
- 0
- 1
- does not exist

18 of 100
196 PU_2016_139_E
A steel ball of mass 1 kg and specific heat 0.4 kJ/kg is at a temperature of 60°C. It is drop into 1 kg of water at 20°C. The final steady state temperature of water (in °C) is:-

- 40
- 30
- 35
- 23.5

19 of 100
176 PU_2016_139_E
Navier-Stokes equation represent the conservation of:-

- Pressure
- Energy
- Momentum
- Mass

20 of 100
203 PU_2016_139_E

At the triple point of a pure substance, the number of degrees of freedom is:-

○ 3

○ 2

○ 0

○ 1

166 PU_2016_139_E

A thin gas cylinder with an internal radius of 100 mm is subject to an internal pressure of 10 MPa. The maximum permissible working stress is restricted to 100 Mpa. The minimum cylinder wall thickness (in mm) for safe design must be:-

○ 8

○ 10

○ 8.5

○ 10.5

205 PU_2016_139_E

A cycle consisting of two reversible isothermal processes and two reversible isobaric processes is known as:-

○ Brayton cycle

○ Erricson cycle

○ Atkinson cycle

○ Stirling cycle

201 PU_2016_139_E

1 kg of water at room temperature is brought into contact with a high temperature thermal reservoir. The entropy change of the universe is:-

○ equal to zero

○ always positive

○ equal to entropy change of water

○ equal to entropy change of the reservoir

148 PU_2016_139_E

The brake commonly used on train boggies is:-

○ band and block brake

○ internal expanding

○ band brake

shoe brake

111 PU_2016_139_E
Area bounded by the parabola $2y = x^2$ and the line x = y - 4 is equal to:-

○ 18

○ 24

○ 6

○ none of the above

177 PU_2016_139_E
The predominant forces acting on an element of fluid in the boundary layer over a flat plate in a uniform, parallel stream are:-

○ viscous and body forces

○ viscous and pressure forces

○ viscous and inertia forces

○ inertia and pressure forces

168 PU_2016_139_E
If the radius of wire stretched by a load is doubled, then its Young's modulus will:-

○ become four times

○ be halved

○ be doubled

○ remain unaffected

160 PU_2016_139_E
The number of independent elastic constants required to define the stress-strain relationship for an isotropic elastic solid is:-

○ 3

○ 1

○ 2

○ 4

212 PU_2016_139_E
LMTD in case of counter flow heat exchanger compared to parallel flow will be:-

○ more

○ less

○ same

○ depending on other factors

30 of 100
146 PU_2016_139_E
The Bifilar suspension method is used to determine:-

○ MOI of irregular geometries

○ position of balancing weights

○ MOI of regular geometries

○ natural frequency of vibration

31 of 100
173 PU_2016_139_E
Loss of head due to friction in a pipe of uniform diameter with viscous flow is equal to:-

○ 4/Re

○ 1/Re

○ Re

○ 16/Re

32 of 100
127 PU_2016_139_E
The hardness testing method which does not involve resistance to plastic deformation is:-

○ Shore scleroscope

○ Brinell

○ Vickers

○ Rockwell

33 of 100
130 PU_2016_139_E
Effect of the force on a body depends upon:-

○ magnitude

○ direction

○ position or Line of action

○ all of the above

34 of 100
172 PU_2016_139_E
Kinematic viscosity of air at 20°C is given to be 1.6×10^{-5} m^2/s. its kinematic viscosity (in m^2/s) at 70°C will be varying approximately:-

○ 3.2×10^{-5}

○ 1.2 x 10^{-5}

○ 1.6 x 10^{-5}

○ 2.2 x 10^{-5}

35 of 100
149 PU_2016_139_E
Practically the sensitiveness of Watt and Porter governor are:-

○ Same

○ double

○ 4 times

○ half

36 of 100
164 PU_2016_139_E
A solid circular shaft of 60 mm diameter transmits a torque of 1600 N-m. The value of maximum shear (in MPa) developed is:-

○ 47.72

○ 67.72

○ 57.72

○ 37.72

37 of 100
131 PU_2016_139_E
Which of the following is not a vector quantity?

○ acceleration

○ moment

○ velocity

○ weight

38 of 100
158 PU_2016_139_E
American standard thread have the angle equal to:-

○ 55°

○ 58°

○ 60°

○ 29°

39 of 100
197 PU_2016_139_E

A steam turbine receives steam steadily at 10 bar with an enthalpy of 3000 kJ/kg and discharges at 1 bar with an enthalpy of 2700 kJ/kg. The work output is 250 kJ/kg. Neglect the kinetic and potential energy changes. The heat transfer (in kJ/kg) from the turbine casing to the surrounding is equal to:-

- ○ 0
- ○ 50
- ○ 150
- ○ 250

207 PU_2016_139_E
In the Rankine cycle, when superheated steam is used:-

- ○ thermal efficiency increases
- ○ steam consumption decreases
- ○ steam dryness after expansion increases
- ○ all of the above

156 PU_2016_139_E
Thickness of strap for double strap joint in terms of thickness of plate t is equal to:-

- ○ 0.3t to 0.5t
- ○ 1.3t to 2t
- ○ 0.6t to t
- ○ 1.2t

199 PU_2016_139_E
A Carnot cycle is having an efficiency of 0.75. If the temperature of the high temperature reservoir is 727°C, what is the temperature (in °C) of low temperature reservoir?

- ○ -23
- ○ 0
- ○ 250
- ○ 23

144 PU_2016_139_E
Resonance occurs in a vibrating system when the natural frequency is forced frequency.

- ○ lesser than
- ○ greater than
- ○ equal to
- ○ greater than or equal to

208 PU_2016_139_E

For a given set of operating pressure limits in a Rankine cycle, the highest thermal efficiency occurs for:-

○ saturated cycle

○ reheat cycle

○ superheated cycle

○ regenerative cycle

163 PU_2016_139_E

For a simply supporting beam on two end supports the bending moment is maximum:-

○ where there is no shear force

○ at maximum deflection point

○ usually on the supports

○ always at mid span

175 PU_2016_139_E

Existence of velocity potential implies that:-

○ fluid is in continuum

○ fluid is ideal

○ fluid is compressible

○ fluid is irrotational

165 PU_2016_139_E

A gas is stored in a cylindrical tank of inner radius 7 m and wall thickness 50 mm. The gage pressure of the gas is 2 MPa. The maximum shear stress (in MPa) in the wall is:-

○ 280

○ 70

○ 35

○ 140

171 PU_2016_139_E

The difference in pressure (in N/mm^2) across an air bubble of diameter 0.001 m immersed in water (surface tension = 0.072 N/m) is:-

○ 140

○ 728

○ 288

○ 680

49 of 100
200 PU_2016_139_E
A solar energy based heat engine which receives 80 kJ of heat at 100°C and rejects 70 kJ of heat to the ambient at 30°C is to be designed. The thermal efficiency (in %) of heat engine is:-

○ 70

○ 28.2

○ 12.5

○ 18.8

50 of 100
206 PU_2016_139_E
A single-acting two stage compressor with complete intercooling delivers air at 16 bar. Assuming an intake state of 1 bar at 15°C, the pressure ratio per state is:-

○ 16

○ 4

○ 2

○ 8

51 of 100
113 PU_2016_139_E
Matrix $B = A^T$, where A is any matrix is:-

○ skew symmetric

○ another general matrix

○ symmetric about secondary diagonal

○ always symmetric

52 of 100
132 PU_2016_139_E
If a suspended body is struck at the centre of percussion, then the pressure on the axis passing through the point of suspension will be:-

○ infinity

○ zero

○ minimum

○ maximum

53 of 100
167 PU_2016_139_E
For a long slender column of uniform cross section, the ratio of critical buckling load for the case with both ends clamped to the case with both ends hinged is:-

○ 4

○ 3

○ 1

○ 2

54 of 100

195 PU_2016_139_E

A pump handling a liquid raises its pressure from 1 bar to 30 bar. Take the density of liquid as 990 kg/m^3. The isentropic specific work done by the pump (in kJ/kg) is:-

○ 0.1

○ 0.3

○ 2.5

○ 2.93

55 of 100

145 PU_2016_139_E

A typewriter mechanism has 7 numbers of binary joints, six links and none of higher pairs. The mechanism is:-

○ not at all formed

○ not sound

○ kinematically sound

○ none of the above

56 of 100

128 PU_2016_139_E

Thermosetting plastics are joined by:-

○ adhesive welding

○ ultrasonic welding

○ friction welding

○ hot air welding

57 of 100

211 PU_2016_139_E

When a heat is transferred by molecular collision, it is referred to as heat transfer by:-

○ radiation

○ convection

○ conduction

○ both conduction and radiation

58 of 100

174 PU_2016_139_E

For fluid element in a 2D flow field (x-y plane) it will undergo:-

○ deformation only fuel

○ translation and rotation

○ translation and deformation

○ translation only

59 of 100

210 PU_2016_139_E

Heat transfer takes place as per:-

○ zeroth law of thermodynamics

○ second law of thermodynamics

○ first law of thermodynamics

○ third law of thermodynamics

60 of 100

198 PU_2016_139_E

A condenser of a refrigeration system rejects heat at a rate of 120 kW, while its compressor consumes a power of 30 kW. The COP of the system would be:-

○ 4

○ 1/4

○ 1/3

○ 3

61 of 100

225 PU_2016_139_M

A dummy activity is used in PERT network to describe:-

○ resource restriction

○ resource idleness

○ precedence relationship

○ necessary time delay

62 of 100

223 PU_2016_139_M

All bodies above absolute zero temperature emit radiation. This statement is:-

○ Planck's law

○ Wein's law

○ Prevost theory

○ Stefan's law

63 of 100

221 PU_2016_139_M

For steady heat transfer with constant value of thermal conductivity, the temperature distribution in a plane wall will be:-

○ hyperbolic

○ linear

○ parabolic

○ cubic

247 PU_2016_139_M
Angle made by the face of tool on the plain parallel to the base of the cutting tool is called:-

○ lip angle

○ clearance angle

○ rake angle

○ cutting angle

241 PU_2016_139_M
In the relation for cutting tool life $VT^n = C$, the numerical value of n for high speed steel tools vary in the range:-

○ 0.25 to 0.4

○ 0.4 to 0.55

○ 0.2 to 0.25

○ 0.1 to 0.15

248 PU_2016_139_M
Consumable electrode are used in the process:-

○ MIG

○ TIG

○ laser

○ thermit

244 PU_2016_139_M
In chemical milling process, chemical etching reagent is used. The chemical reagent for aluminium work piece is:-

○ caustic soda

○ sodium sulphate

○ nitric acid

○ sodium chloride

228 PU_2016_139_M
CPM is:-

○ time oriented technique

○ activity oriented technique

○ work oriented technique

○ event oriented technique

249 PU_2016_139_M
In deep drawing of sheets, the values of limiting draw ratio depends on:-

○ thickness of sheet

○ yield strength of sheet metal

○ type of press used materials

○ % elongation of sheet metal

240 PU_2016_139_M
In ECM, the material removal is due to:-

○ ion displacement

○ fusion

○ corrosion

○ erosion

227 PU_2016_139_M
In simplex method, when all the basic variables are greater than zero (>0), the solution is called as:-

○ a) non-degenerate

○ b) degenerate

○ c) basic solution

○ d) both (a) and (c)

224 PU_2016_139_M
Emissivity of a body is equal to absorptivity if the body is:-

○ in thermal equilibrium

○ at low temperature

○ at high temperature

○ independent of temperature

243 PU_2016_139_M
Two cutters are mounted on the arbour so that two faces are machined simultaneously in:-

○ straddle milling

○ pendulum milling

○ gang milling

○ profile milling

229 PU_2016_139_M
The mathematical technique for finding the best use of limited resources in an optimum manner is called:-

○ queuing theory

○ operation research

○ linear programming

○ network analysis

246 PU_2016_139_M
Cutting ratio is the ratio of:-

○ chip thickness to depth of cut

○ depth of cut to chip thickness

○ cutting velocity to chip velocity

○ chip velocity to cutting velocity

242 PU_2016_139_M
A hole '1 mm' is to be drilled in glass. It could best be done by:-

○ electro-beam drilling

○ plasma arc drilling

○ ultrasonic drilling

○ laser drilling

222 PU_2016_139_M
The thickness of thermal and hydrodynamic boundary layer is equal if (Pr = Prandtl number; Nu = Nusselt number):-

○ Pr = Nu

○ Pr > 1

○ Pr < 1

○ Pr = 1

226 PU_2016_139_M
The word KANBAN is most appropriately associated with:-

○ just-in-time production

○ economic order quantity

○ capacity planning

○ product design

245 PU_2016_139_M
Continuous chips are formed during machining of:-

○ cast iron

○ mild steel

○ aluminium

○ wrought iron

220 PU_2016_139_M
Critical thickness of insulation for sphere is given by:-

○ k/h

○ 2k/h

○ h/2k

○ k/4πh

290 PU_2016_139_D
In an atom, the mass of electron in comparison to neutron is:-

○ 1/152

○ 1/1839

○ 1/12645

○ same

272 PU_2016_139_D
Ozone layer depletion indicates the impairment of:-

○ ionosphere

○ troposphere

○ stratosphere

○ lithosphere

270 PU_2016_139_D
The sub cooling in a refrigeration cycle:-

○ increases work of compression

○ increases COP

○ reduces condenser size

○ reduce cooling

274 PU_2016_139_D
The working substance that is not enlisted as cryogenic fluid is :-

○ helium

○ hydrogen

○ oxygen

○ ammonia

286 PU_2016_139_D
The engine that is mostly preferred when the overhead clearance is less is:-

○ V-type

○ horizontal

○ in-line radial

○ vertical

294 PU_2016_139_D
Steam exhaust from high pressure turbine is reheated in:-

○ economizer

○ a separate coil

○ boiler drum

○ super heater tubes

271 PU_2016_139_D
If a refrigerant having low specific heat, then COP will be:-

○ same

○ independent of specific heat

○ higher

○ lower

276 PU_2016_139_D
A room contains 35 kg of dry air and 0.5 g of water vapour. The total pressure and temperature of air in the room are 100 kPa and 25°C respectively. Given that the saturation pressure for water at 25°C is 3.17 kPa, the relative humidity of the air in the room is:-

○ 83%

○ 71%

○ 67%

○ 55%

273 PU_2016_139_D
The refrigerant that has comparatively higher GWP is:-

○ carbon dioxide

○ R152a

○ R134a

○ R32

298 PU_2016_139_D
The enthalpy drop in a convergent-divergent nozzle is 420 kJ/kg. The velocity at the exit of the nozzle at ideal conditions will be around:-

○ 916 m/s

○ 335 m/s

○ 659 m/s

○ 1165 m/s

299 PU_2016_139_D
In a four-wheeler automobile vehicle, the mechanical power from the gear box to rear axle is transmitted through:-

○ clutch

○ propeller shaft

○ chain drive

○ universal joint

288 PU_2016_139_D
The brake mean effective pressure of an IC engine with increasing speed will:-

○ decrease

○ increase

○ fluctuate according to engine speed

○ remain unaffected

296 PU_2016_139_D
A Ljungstrom turbine is:-

○ an outward radial flow turbine

○ pressure compounded turbine

○ an inward radial flow turbine

○ velocity compounded turbine

275 PU_2016_139_D
For unsaturated air, the dew point temperature as compared to wet bulb temperature is :-

○ less

○ more

○ unpredictable

○ equal

289 PU_2016_139_D
Use of petrol in a diesel engine causes:-

○ incomplete combustion

○ higher knocking

○ production of black smoke

○ lower thermal efficiency

297 PU_2016_139_D
The pressure in the gland steam header for sealing the glands of low pressure steam turbine is maintained at:-

○ atmospheric pressure

○ 2 - 5 bar

○ around 710 - 760 water column

○ around 100 - 200 water column

295 PU_2016_139_D
The boiler in which the steam generated has a temperature and pressure of 700°C and 310 bar respectively is known as:-

○ critical boiler

○ ultra super-critical boiler

○ super-critical boiler

○ sub-critical boiler

277 PU_2016_139_D
Sensible heat factor is defined as the ratio of:-

○ latent heat to sensible heat

○ latent heat to total heat

○ sensible heat to total heat

○ sensible heat to latent heat

287 PU_2016_139_D
The function of a distributer in a multi-cylinder engine of an automobile is to:-

○ distribute fuel equally to all cylinder

○ time the spark

○ regulate power

○ inject fuel at appropriate time

285 PU_2016_139_D
The delay period in petrol engine is of the order of:-

○ 0.002 s

○ 0.05 s

○ 0.001 s

○ 0.01 s