SDSC TA 2017

Q1. In 18/8 steel, what is the percentage of chromium ?
(a) 18
(b) 8
(c) 1
(d) 0

Q2. Case hardening is
(a) done to get a soft ductile interior with a very hard surface
(b) done to get a hard ductile interior with a very hard surface
(c) followed by tempering
(d) none of the above

Q3. In spur gears, the profile is
(a) surface of top of tooth
(b) curve forming face and flank
(c) part of tooth surface below pitch surface
(d) circular shape

Q4. Efficiency of Carnot cycle is the function of
(a) absolute temperature range
(b) absolute pressure
(c) properties of air
(d) none of the above

Q5. For same compression ratio
(a) thermal efficiency of Otto cycle is greater than that of diesel cycle
(b) thermal efficiency of Otto cycle is less than that of diesel cycle
(c) both a & b
(d) thermal efficiency of Otto cycle is equal to that of diesel cycle

Q6. In a cam and follower mechanism, cam is a
(a) follower
(b) driver
(c) frame
(d) actuator

Q7. When a shaft is subjected to combined twisting moment (T) and bending moment (M), the equivalent bending moment is equal to
(a) $\sqrt{M^2 + T^2}$
(b) $\sqrt{M^2 + 4T^2}$
(c) $\sqrt{4M^2 + T^2}$
(d) $\frac{1}{2}\left[M + \sqrt{M^2 + T^2}\right]$

Q8. In solid shaft, stress at the center is
(a) Maximum
(b) Minimum
(c) Zero
(d) Average

Q9. Keys are generally made of
(a) Mild steel
(b) High carbon steel
(c) C.I
(d) Wrought iron

Q10. In designing a shaft, hub and key for a system, weakest member taken is
(a) shaft
(b) hub
(c) key
(d) all are equally strong

Q11. The resultant of two forces P and Q acting at an angle θ is
(a) $\sqrt{P^2 + Q^2 + 2PQsin\theta}$
(b) $\sqrt{P^2 + Q^2 + 2PQcos\theta}$
(c) $\sqrt{P^2 + Q^2 - 2PQcos\theta}$
(d) $\sqrt{P^2 + Q^2 - 2PQsin\theta}$

Q12. One kg force is equal to

(a) 1.02 N
(b) 8.9 N
(c) 9.8 N
(d) 12 N

Q13. A 16N force produce a moment of 64 Nm. The moment arm is
(a) 2m
(b) $\sqrt{2}$ M
(c) 8m
(d) 4m

Q14. Whenever a material is loaded within elastic limit, stress is _____strain.
(a) equal to
(b) directly proportional to
(c) inversely proportional to
(d) not equal

Q15. The impact strength of a material is an index of its
(a) Toughness
(b) Tensile strength
(c) Fatigue strength
(d) Hardness

Q16. For a material with poisons ratio 0.25, the ratio of modulus of rigidity to modulus of elasticity will
(a) 0.4
(b) 1.2
(c) 2.0
(d) 3.6

Q17. For minimum work in compressor operating between limits P_1 and P_3 the intercooler P_2 is given by
(a) $P_2 = \sqrt{P_1 + P_3}$
(b) $P_2 = \sqrt{P_1 - P_3}$
(c) $P_2 = \sqrt{P_1 P_3}$
(d) $P_2 = P_1 + P_3$

Q18. Cetane number is the measure of
(a) viscosity of fuel
(b) ignition quality
(c) calorific value of fuel
(d) auto-ignition

Q19. What is the propulsive efficiency?
(a) it is the ratio of thrust power and propulsive power
(b) it is the ratio of thrust power and heat increased by combustion of fuel
(c) it is the ratio of propulsive work and heat released by combustion of fuel
(d) it is the ratio engine output and propulsive work

Q20. Which one is S.I engine
(a) petrol
(b) diesel
(c) gas
(d) none of the above

Q21. The flow through a nozzle is regarded as
(a) adiabatic flow
(b) constant volume flow
(c) isothermal flow
(d) constant pressure flow

Q22. At 100% RH, the three characteristics DBT, WBT & DPT are
(a) Different
(b) Equal
(c) Any two are equal
(d) none of the above

Q23. Which one of the following is mounted between the engine and gearbox?
(a) propeller shaft
(b) differential
(c) clutch
(d) reduction gear

Q24. Quality may be defined as
(a) fitness for purpose

(b) degree of preference and excellence
(c) conformance to specification
(d) all of them

Q25. Founder of micro motion study is
(a) Taylor
(b) Fayal
(c) Gilbreth
(d) Mundel

Q26. PERT/CPM are
(a) analytical methods
(b) graphical methods
(c) inspection techniques
(d) network techniques

Q27. The rivet of a riveted joint is subjected to
(a) tensile stress
(b) bending stress
(c) shear stress
(d) all of the above

Q28. The energy stored in a body when strained within elastic limit is known as
(a) resilience
(b) proof resilience
(c) strain energy
(d) impact energy

Q29. A beam supported on more than two supports is called
(a) simply supported beam
(b) continuous beam
(c) fixed beam
(d) overhung beam

Q30. The bending moment at the end of a cantilever beam is
(a) zero
(b) minimum
(c) maximum
(d) average

Q31. The bending moment diagram for simply supported loaded in its center is
(a) a right angled triangle
(b) an isosceles triangle
(c) an equilateral triangle
(d) a rectangle

Q32. The height of the chimney in a steam power plant is governed by
(a) control of pollution
(b) draught to be produced
(c) flue gases
(d) type of boiler

Q33. A Pelton wheel is an
(a) axial flow impulse turbine
(b) inward flow impulse turbine
(c) outward flow impulse turbine
(d) inward flow reaction turbine

Q34. Ratio of shaft power to brake power is called
(a) mechanical efficiency
(b) hydraulic efficiency
(c) overall efficiency
(d) turbine efficiency

Q35. One horse power is equal to
(a) 102 watts
(b) 75 watts
(c) 550 watts
(d) 735 watts

Q36. The point of application of the total pressure on the surface is called
(a) centroid of the surface
(b) center of pressure
(c) center of gravity
(d) center of area

Q37. The pressure of liquid on a surface will always act _____ to the surface.
(a) parallel
(b) normal

(c) 45^0
(d) 60^0

Q38. The symbol o represents
(a) circularity
(b) cylindricity
(c) roundness
(d) concentricity

Q39. 1 ton of refrigeration implies heat transfer at the rate of
(a) 210 kJ/min
(b) 210 kJ/sec
(c) 1000 kJ/hr.
(d) 2 kJ/hr.

Q40. Ratio of refrigerating effect to the work supplied is called
(a) Coefficient Of Performance (COP)
(b) Energy Performance Ratio (EPR)
(c) Efficiency
(d) Relative COP

Q41. Bell-Coleman cycle is applicable to
(a) Vapor compressor refrigeration
(b) Vapor absorption refrigeration
(c) Air refrigeration
(d) All of them

Q42. A refrigerant mostly used for reciprocating compressor is
(a) NH_3
(b) CO_2
(c) Freon-12
(d) Freon-22

Q43. Throttling operation occurs in
(a) Evaporator
(b) Expansion Valve
(c) Condenser
(d) Compressor

Q44. The point of contra flexure is a point where
(a) Shear force changes sign
(b) Bending moment changes sign
(c) Shear force is maximum
(d) Bending moment is maximum

Q45. If a simply supported beam is subjected to a uniformly distributed load, then the upper layer of the beam will be in
(a) tension
(b) compression
(c) both
(d) either a or b

Q46. The volumetric strain is the ratio of the
(a) original volume of the change in volume
(b) change in volume to the original volume
(c) change in thickness to the original thickness
(d) change of volumetric strain

Q47. Identify the hardest metal
(a) Iron
(b) Platinum
(c) Tungsten
(d) Diamond

CC

Q49. Compressive strength of cast iron as compared to tensile strength is
(a) more
(b) less
(c) same
(d) none of the above

Q50. In a flange coupling, the flange bolts are designed for
(a) fatigue
(b) shear force
(c) compression
(d) tensile force

Q51. The material used for coating the electrode is called

(a) flux
(b) slag
(c) deoxidizer
(d) binder

Q52. The thread used for transmission of power is
(a) Square thread
(b) Buttress thread
(c) Acme thread
(d) British association thread

Q53. The angle of Acme thread is
(a) 60^0
(b) 47.5^0
(c) 29^0
(d) 45^0

Q54. RMS method gives
(a) Tolerance
(b) Allowance
(c) Surface roughness
(d) Fit

Q55. The relation between two assembling ports is known as
(a) Limit
(b) Fit
(c) Allowance
(d) Tolerance

Q56. The module of gear wheel of circular pitch 6π is
(a) 1/6
(b) 6
(c) π
(d) $\pi/6$

Q57. Lewis equation is applied
(a) only to the pinion
(b) only to the gear
(c) to stronger of the pinion or gear
(d) to weaker of the pinion or gear

Q58. In V belts the contract between the pulley and the belt is at the
(a) Bottom only
(b) Both side and bottom
(c) Top and bottom
(d) Sides only

Q59. Normally spring operates within
(a) elastic limits
(b) plastic limits
(c) elastic-plastic limits
(d) all of the above

Q60. Thin shell of thickness 't' and diameter d, is subjected to an internal pressure of p. Then the hoop stress induced is equal to
(a) pd/2t
(b) pd/4t
(c) pd/6t
(d) pd/t

SDSC TA 2017 SOLUTION

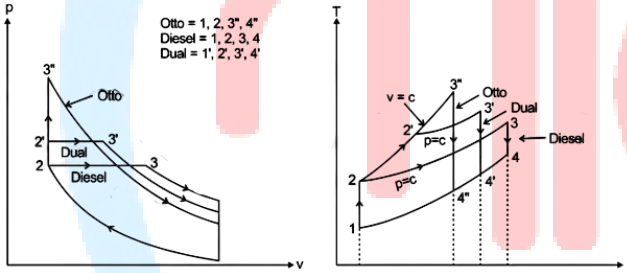
Ans1.a
Solution:

Ans2. a
Solution: Case hardening is a method used to harden the outer surface of low-carbon steel while leaving the center or core soft and ductile. Case hardening involves heating the metal to its critical temperature in some carbonaceous material

Ans3. b
Solution: In spur gear, the tooth profile starts from the base circle, covers the face and flank region and finally ends at top of the tooth

Ans4. a
Solution:

Ans5. a
Solution:
Otto cycle has more area under the P-V diagram compared to the diesel cycle



Ans6. b
Solution:

Ans7. d
Solution:

Ans8. c
Solution:

For the solid shaft, at the center, the stress is zero.

Stress is never zero in the hollow shaft although it is minimum at the inner surface of the shaft.

Ans9. a
Solution:

Ans10. c
Solution:
Key is the weakest member in the assembly of shaft, pulley and key. Key acts as a safety device, whenever there is excess load appears on the pulley key fails first and it keeps safer to shaft and pulley.

Ans11. b
Solution:

Ans12. c
Solution:

Ans13. d
Solution:
Moment = Force x moment arm
64 = 16 x a
A = 4m

Ans14. b
Solution:

Ans15. a
Solution:
Impact strength is the capability of the material to withstand a suddenly applied load and is expressed in terms of energy. Often measured with the Izod impact strength test or Charpy impact test, both of which measure the impact energy required to fracture a sample. Thus, the impact strength of a material is an index of its toughness.

Ans16. a
Solution:

Ans17. c
Solution:
A higher cetane number resulting in quicker ignition of the fuel leads to less non-ignited fuels building up inside the combustion chamber, as well as more complete fuel combustion.

Ans18. b
Solution:

Ans19. a
Solution:
The propulsive efficiency is the fraction of total mechanical power output that is imparted to the working fluid and converted to the thrust power (as opposed to how much is wasted).

Ans20. a
Solution:

Ans21. a
Solution:

Ans22. b
Solution:
When relative humidity of the air is 100%, i.e. the air is saturated, the dew point temperature (DPT) equals the wet bulb temperature (WBT), which is also equal to the dry bulb temperature.

Ans23. c
Solution:

Ans24. d
Solution:
It may be defined as fitness for purpose or conformance to requirements. It is the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs. It is the degree to which a product or service satisfies the requirements of the user.

Ans25. c
Solution:
This technique was developed by Fran Gilbreth who considered that an operation consists of minute elements which may be repetitive or non-repetitive. He termed these elements THERBLIG (after his name Gilbreth if spelt bank word is Therblig).

Ans26. d
Solution:

Ans27. d
Solution:

Ans28. c
Solution:

Ans29. b
Solution:

Ans30. a
Solution:

Ans31. b
Solution:

Ans32. b
Solution:
The height of the chimney in a steam plant is governed by Draught to be produced. Draught It is a small pressure difference causing the flow of flue gas and air through the boilers. It is necessary for efficient combustion and to release the gases at sufficient height to avoid local pollution.

Ans33. a
Solution:

Ans34. a

Solution:

Ans35. d
Solution:

Ans36. b
Solution:

Ans37. b
Solution:

Ans38. d
Solution:

Ans39. a
Solution:

Ans40. a
Solution:

Ans41. c
Solution:
Bell Coleman cycle is also known as Reversed Brayton cycle or Reversed Joule cycle The working fluid of the Bell Coleman refrigeration cycle is Air. This system of refrigeration is used for Air Craft refrigeration and it has light weight.

Ans42. c
Solution:

Ans43. b
Solution:
An expansion device is essentially a restriction offering resistance to flow so that the pressure drops, resulting in a throttling process. An expansion device in the refrigeration system normally serves two purposes.

Ans44. b
Solution:

Ans45. b
Solution:
Sagging Or Positive Bending Moment :
We take bending moment at a section as positive if Force tends to bend the beam at that considered point. This bending forms to curvature having concavity at the top. Concavity at the top indicates compression in the top fibers of the beam.

Ans46. b
Solution:
Whenever there is stress applied on an object from all the sides or some sides then there will be a change in its volume (dv) and if its original volume is V then according to the definition of strain volumetric strain = dv/v.

Ans47. d
Solution:

MOHS Hardness Scale

1	Talc
1.3	Asphalt
1.5	Tin, Lead, Graphite
2	Calcium, Cadmium, Sulfur
2.5-3	Gold, Silver, Aluminium
3	Copper
4	Iron, Nickel
4-4.5	Platinum, Steel
5	Cobalt, Obsidian
5.5-6	Glass
6-7	Gused Quartz, Iron Pyrite
7.5 - 8	Hardened Steel
9-9.5	Tungsten Carbine, Titanium Carbide
10	Diamond

Ans48. d
Solution:

Ans49. a
Solution:

Ans50. b
Solution:
Bolts are subjected to direct shear stress due to force and not torsional shear stress.

Ans51. a
Solution:
A flux coating is a layer of a chemical that acts as a cleaning agent, a purifying agent, or a flowing agent. It protects the weld pool and solid metal from atmospheric contamination and helps in removing impurities from the weld pool.

Ans52. a
Solution:
Buttress thread is used to transmit power in a single direction. It has advantages of both a square thread(Low friction resistance) and V thread (strength).

Ans53. c
Solution:

Ans54. c
Solution:

Ans55. b
Solution:
Fit is a relationship that exists between two mating parts, a hole, and a shaft, with respect to their dimensional difference before assembly.

Ans56. b
Solution:

Ans57. d
Solution:

Ans58. d
Solution:

The Lewis equation is applied only to the weaker of the two wheels (i.e. Pinion or gear).

Ans59. a
Solution:

Ans60. a
Solution: