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Section : **Machine Design Engineering Design**

Q.1 Zipper as a surface defect occurs in

A. Casting process

B. Welding process

C. Machining process

D. Rolling process

Ans
✗ 1. A
✗ 2. B
✗ 3. C
✓ 4. D

Question ID : **5834932115**

Q.2 A train has to negotiate a curve of radius 400 m. By how much should the outer rail be raised with respect to the inner rail for speed of 48 km/h if the distance between the rails is 1 m?

A. 0.045 m

B. 0.454 m

C. 0.056 m

D. 0.304 m

Ans
✓ 1. A
✗ 2. B
✗ 3. C
✗ 4. D

Question ID : **5834932134**

Q.3 According to Indian Standard specifications, a grey cast iron designed by 'FG 200' means that

A. Carbon content 20%

B. Maximum compressive strength is 200 MPa

C. Minimum tensile strength is 200 MPa

D. Maximum shear strength is 200 MPa

Ans
✗ 1. A
✗ 2. B
✓ 3. C
✗ 4. D

Question ID : **5834932146**

Q.4 What is the other name of a linear triangular element for plane elasticity problems.

A. Constant strain triangle

B. Linear strain triangle

C. Quadratic strain triangle

D. Variable strain triangle

Ans
✓ 1. A
✗ 2. B
✗ 3. C
✗ 4. D

Question ID : **5834932140**

Q.5 Which one of the following physical property will be conserved due to Newton's third law of motion?

A. Momentum

B. Angular momentum

C. Acceleration

D. Force exerted

Ans
✓ 1. A
✗ 2. B
✗ 3. C
✗ 4. D

Question ID : **5834932128**

Q.6 A car of mass 1125 kg descends a hill of 1 in 5 (slope). Calculate the average braking force required using an energy method to bring the car to rest from 72 km/h in 50 m. Take the frictional resistance to motion as 250 N.

A. 6.46 kN

B. 7.2 kN

C. 5.64 kN

D. 8.12 kN

Ans ✔ 1. A

✘ 2. B

✘ 3. C

✘ 4. D

Question ID : **5834932133**

Q.7 Coefficient of friction is independent of _____

A. Temperature

B. Hardness

C. Surface hardness

D. Surface area of contact

Ans ✘ 1. A

✘ 2. B

✘ 3. C

✔ 4. D

Question ID : **5834932158**

Q.8 The distance d between adjacent planes of a set of parallel planes of the indices (h, k, l) is given by----, where a is the edge of the cube.

A. d = a/sqrt(h+k+l)

B. $d = a^2/sqrt(h^2+k^2+l^2)$

C. $d = a/sqrt(h^2+k^2+l^2)$

D. $d = a^3/sqrt(h^2+k^2+l^2)$

Ans ✘ 1. A

✘ 2. B

✔ 3. C

✘ 4. D

Question ID : **5834932147**

Q.9 A certain pressure vessel manufacturer avoids reinforcement calculations for openings by always providing a reinforcing pad extending up to double the diameter opening and of the same material and same thickness of that of the shell. If area compensation is accepted as code guideline, his approach leads to safe design

A. Only if the opening is on spherical vessel

B. Only if the opening is on vertical cylindrical vessel

C. Only if the opening is on horizontal vessel

D. Irrespective of the shape of the vessel

Ans

✗ 1. A

✗ 2. B

✗ 3. C

✓ 4. D

Question ID : **5834932153**

Q.10 Hazards associated with the relief valve leakage for extremely hazardous material storage can be taken care by providing

A. Dikes

B. Rupture Disc

C. Surge Chamber

D. None of the above

Ans

✗ 1. A

✓ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932149**

Q.11 In under damped vibrating system, if $x_1$and x_2 are the successive values of the amplitude on the same side of mean position, then the logarithmic decrement is equal to

A. x_1/ x_2

B. $\log_{10} (x_1/ x_2)$

C. $\log_e (x_1/ x_2)$

D. $\log_e (x_1.x_2)$

Ans

✗ 1. A

✗ 2. B

✓ 3. C

✗ 4. D

Question ID : **5834932122**

Q.12 One of the advantages given below of the forged parts is not correct. Find it.

A. High production rate

B. Higher forging head

C. Less die wear

D. Lower forging temperature

Ans
✗ 1. A
✗ 2. B
✓ 3. C
✗ 4. D

Question ID : **5834932114**

Q.13 When there is a reduction in amplitude over every cycle of vibration, then the body is said to have

A. Free vibration

B. Forced vibration

C. Damped vibration

D. None of the above

Ans
✗ 1. A
✗ 2. B
✓ 3. C
✗ 4. D

Question ID : **5834932121**

Q.14 For perfectly elastic bodies, the value of coefficient of restitution is _____

A. 0

B. 0.5

C. 1

D. Between 0.5 to 1

Ans
✗ 1. A
✗ 2. B
✓ 3. C
✗ 4. D

Question ID : **5834932131**

Q.15 According to Griffith, if 'f' is the stress at fracture and 'a' is flaw length, then which of the following remains constant

A. $f \times a^{1/2}$

B. $f \times a$

C. f/a

D. $f/a^{1/2}$

Ans
✓ 1. A
✗ 2. B
✗ 3. C
✗ 4. D

Question ID : **5834932118**

Q.16 Moment of inertia of a square of side 'b' about an axis through its centre of gravity is:

A. $b^3/4$

B. $b^4/12$

C. $b^3/6$

D. $b^3/12$

Ans ✗ 1. A

✓ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932130**

Q.17 In a CAD Package, mirror image of a 2D point P (30,50) is to be obtained about a line which passes through the origin and makes an angle of 45° counter clockwise with X-axis. The coordinates of the transformed point will be

A. -30, -50

B. -30, 50

C. 30, -50

D. 50, 30

Ans ✗ 1. A

✗ 2. B

✗ 3. C

✓ 4. D

Question ID : **5834932155**

Q.18 A body in equilibrium is at rest or can translate with uniform velocity if:

A. $\sum F = 0; \sum M \neq 0$

B. $\sum F \neq 0; \sum M = 0$

C. $\sum F = 0; \sum M = 0$

D. None of the above

Ans ✗ 1. A

✗ 2. B

✓ 3. C

✗ 4. D

Question ID : **5834932132**

Q.19

Determine the eigen values for the matrix $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$

A. 1,3

B. 1,4

C. 3,5

D. 1,2

Ans ✔ 1. A

✗ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932139**

Q.20 The centre of gravity of a plane laminate will not be at geometrical centre if it is a

A. Circle

B. Equilateral triangle

C. Right angled triangle

D. Rectangle

Ans ✗ 1. A

✗ 2. B

✔ 3. C

✗ 4. D

Question ID : **5834932129**

Q.21 To determine stress in thin cylinders due to internal pressure, it is assumed that

A. The effect of curvature of the cylinder wall is neglected

B. The tensile stress is distributed uniformly over the section of the walls

C. The effect of the restraining action of the heads at the ends of the vessel is neglected

D. All of the above

Ans ✗ 1. A

✗ 2. B

✗ 3. C

✔ 4. D

Question ID : **5834932150**

Q.22 Fatigue strength for steel at which high cycle fatigue begins respectively in bending, axial & torsional

A. 0.9 S_u, 0.75 S_u, 0.72 S_u

B. 0.75 S_u, 0.9 S_u, 0.72 S_u

C. 0.9 S_u, 0.72 S_u, 0.65 S_u

D. None of the above

Ans ✔ 1. A

✗ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932117**

Q.23 Solid element can consists the following degrees of freedom (d.o.f)

A. 3 translational

B. 3 rotational

C. 3 transnationals and 3 rotationals

D. 6 rotational

Ans ✔ 1. A

✗ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932138**

Q.24 A competitive firm will maximize profit at the output where

A. Difference between price and marginal cost is the highest

B. Difference between marginal revenue and price is the highest

C. The price is higher than the average total cost by the largest possible amount

D. The excess of revenue over the total cost is greatest

Ans ✗ 1. A

✗ 2. B

✗ 3. C

✔ 4. D

Question ID : **5834932116**

Q.25 Steam is preferred to be used as heating medium in heat exchangers because

A. Low Cost

B. High Latent heat

C. Non-Corrosive

D. High Film coefficient

Ans ✗ 1. A

✓ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932148**

Q.26 A cylinder can be created by drawing a rectangular shape then the---- tool will be used w.r.t reference axis.

A. Revolve

B. Sweep

C. Extrude

D. Pattern

Ans ✓ 1. A

✗ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932154**

Q.27 A wooden rectangular prism of density ρ_w, height h and cross section (a x b) is initially dropped in an oil tub (density of oil is ρ_o) up to height of 'x' (h>x) and made to vibrate freely in vertical direction with a frequency ω_n. Now if the prism is replaced by a circular cylinder of r = h/2, and density ρ_w. The natural frequency of the circular cylinder will be

A. $> \omega_n$

B. $< \omega_n$

C. Equal to ω_n

D. Exactly twice of ω_n

Ans ✗ 1. A

✗ 2. B

✓ 3. C

✗ 4. D

Question ID : **5834932125**

Q.28 'Utilitarianism' in the professional ethics is

A. An acquired habit that helps to lead a rational life

B. A skill to solve a current ethical problem by comparing it with similar problems from the past and their outcome

C. A right of activities to decide their own duties

D. A judgement of an action by the consequences of that action

Ans
✗ 1. A
✗ 2. B
✗ 3. C
✓ 4. D

Question ID : **5834932160**

Q.29 If $x > y > 1$ which of the following must be true?

i. $\ln x > \ln y$

ii. $e^x > e^y$

iii. $y^x > x^y$

iv. $\cos x > \cos y$

A. i & ii

B. i & iii

C. iii & iv

D. ii & iv

Ans
✓ 1. A
✗ 2. B
✗ 3. C
✗ 4. D

Question ID : **5834932159**

Q.30 A horizontal spring mass system with coulomb damping has a weight of 5 kg attached to a spring of stiffness 1 kg/cm. if the coefficient of friction is 0.025. Calculate the no. of cycles & corresponding time (approximately) for achieving 50% reduction in initial amplitude of 5 cm.

A. 5 cycles & 4.5 seconds

B. 5 cycles & 2.25 seconds

C. 2.5 cycles & 2.25 seconds

D. 10 cycles & 4.5 seconds

Ans
✗ 1. A
✓ 2. B
✗ 3. C
✗ 4. D

Question ID : **5834932123**

Q.31 A single DOF spring mass system with natural frequency ω_1 is attached to another SDOF spring mass system having same spring stiffness. What is the fundamental frequency of the resultant system?

A. $2\ \omega_1$

B. $\frac{\omega_1}{\sqrt{2}}$

C. $0.618\ \omega_1$

D. $1.61\ \omega_1$

Ans
✗ 1. A
✗ 2. B
✓ 3. C
✗ 4. D

Question ID : **5834932127**

Q.32 Which of the following module of FEA is used to determine the natural frequency.

A. Static Analysis

B. Thermal Analysis

C. Modal analysis

D. All of the above.

Ans
✗ 1. A
✗ 2. B
✓ 3. C
✗ 4. D

Question ID : **5834932136**

Q.33 FEA applied for long cylinders like tunnel, which comes under which category.

A. Plane stress

B. Plane strain

C. Both A & B

D. None.

Ans
✗ 1. A
✓ 2. B
✗ 3. C
✗ 4. D

Question ID : **5834932141**

Q.34 A dimple formation near point of high stress concentration is advantageously used in stress analysis through the method of

A. Photoelasticity

B. Holography

C. Caustics

D. Coherent gradient sensor

Ans

✗ 1. A

✗ 2. B

✓ 3. C

✗ 4. D

Question ID : **5834932157**

Q.35 Accuracy of solution in finite element can be increased by

A. Adopting grid refinement

B. Using higher order element

C. Selection of proper displacement function.

D. None of the above.

Ans

✗ 1. A

✓ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932137**

Q.36 As a stress experimentalist which technique would give maximum range of strain measurement for a given specimen

A. Strain gauge

B. Thermoelastic Stress Analysis

C. Brittle coating

D. Photoelasticity

Ans

✗ 1. A

✓ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932156**

Q.37 LMTD correction factor is used in heat exchanger design for

A. Double pipe heat exchanger

B. Multi pass shell and tube heat exchanger

C. Counter flow of hot and cold fluids

D. Fouling fluids

Ans
✗ 1. A
✗ 2. B
✓ 3. C
✗ 4. D

Question ID : **5834932152**

Q.38 What is the major problem in hot extrusion

A. Design of punch

B. Design of die

C. Wear and tear of die

D. Wear of punch

Ans
✗ 1. A
✓ 2. B
✗ 3. C
✗ 4. D

Question ID : **5834932113**

Q.39 Austempering of steel is done for obtaining

A. Bainite structure

B. Martensite structure

C. Austenitic structure

D. Ferrite structure

Ans
✓ 1. A
✗ 2. B
✗ 3. C
✗ 4. D

Question ID : **5834932144**

Q.40 Consider the case of generation of sound from a point source and measured at a given location with a microphone. It can be considered as a plane wave if

A. The microphone is very near to the source

B. The microphone is far away from the source

C. The microphone is immediately underneath the source

D. The microphone is flush mounted to source in opposite direction

Ans ✗ 1. A

✓ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932124**

Q.41 What are discrete parameter systems?

A. Systems which have infinite number of degrees of freedom

B. Systems which have finite number of degrees of freedom

C. Systems which have no degree of freedom

D. None of the above

Ans ✗ 1. A

✓ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932120**

Q.42 Which stage of fatigue crack is most significant in the high cycle fatigue?

A. Crack initiation

B. Slip band crack growth

C. Crack growth on the plane of high tensile stress

D. Ultimate ductile failure

Ans ✗ 1. A

✓ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932119**

Q.43 There are four samples P, Q, R, S with natural frequencies of 64,96,128 and 256 Hz respectively. A plane wavelength 2.30 m is generated by an instrument. The most perceptible induced vibrations are seen in

A. P

B. Q

C. R

D. S

Ans ✗ 1. A

✗ 2. B

✓ 3. C

✗ 4. D

Question ID : **5834932161**

Q.44 A Cantilever beam of cross section 'A', moment of inertia 'I' and length 'L' is having a natural frequency of 'ω_1'. If the beam is accidentally broken into two halves, the natural frequency of the remaining cantilever beam 'ω_2' will be such that ω_2 / ω_1 is

A. 0.5

B. $\sqrt{2}$

C. 2

D. $2\sqrt{2}$

Ans ✗ 1. A

✗ 2. B

✗ 3. C

✓ 4. D

Question ID : **5834932126**

Q.45 As percentage of carbon increases in steel its----- decreases

A. Corrosion resistance

B. Ultimate strength

C. Hardness

D. Ductility

Ans ✗ 1. A

✗ 2. B

✗ 3. C

✓ 4. D

Question ID : **5834932145**

Q.46 A rocket travels upwards at 75 m/s during a test. When it is at 40m from ground its engine malfunctions and gets shut off. What is the maximum speed with which the rocket will hit the ground?

A. 75.6 m/s

B. 80.1 m/s

C. 85.2 m/s

D. 87.3 m/s

Ans

✗ 1. A

✓ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932135**

Q.47 Atomic packing factor of a face centered cube is

A. 0.6

B. 0.7

C. 0.74

D. 0.84

Ans

✗ 1. A

✗ 2. B

✓ 3. C

✗ 4. D

Question ID : **5834932143**

Q.48 Mechanism of ductile fracture results in which type in shape of fracture.

A. Cone and cup

B. Triangle and rectangle

C. Both A & B

D. None.

Ans

✓ 1. A

✗ 2. B

✗ 3. C

✗ 4. D

Question ID : **5834932142**

Q.49 The value of fouling factor depends on

A. Characteristics of process fluid

B. Velocity of process fluid containing suspended solids

C. Suspended solids in the fluid

D. All of the above

Ans
✗ 1. A
✗ 2. B
✗ 3. C
✓ 4. D

Question ID : **5834932151**

Q.50 How many ways are there for applying a force to enable a crack to propagate?

A. 1

B. 2

C. 3

D. 4

Ans
✗ 1. A
✗ 2. B
✓ 3. C
✗ 4. D

Question ID : **5834932112**