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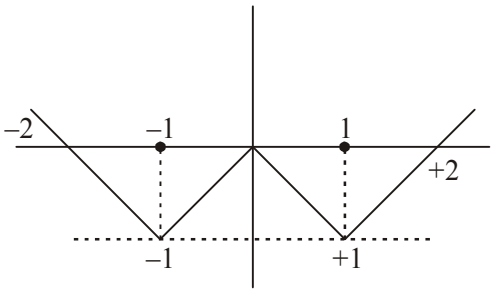
Mechanical Engineering ME

Subject	2018 Morning
General Aptitude	15
Engg. Maths	14
Production Engg.	14
Thermal Engg.	10
Strength of Materials	14
FM&HM	11
Theory of Machines	7
Heat Transfer	2
IM&OR	4
Engg. Mechanics	4
Machine Design	5

1. The function of following graph is



Sol. $||x| - 1| - 1$

2. 1. Some roses are red

2. All red flower fade quickly

3. Some roses fade quickly

(a) Statement 1 is true and statement 2 is false then statement 3 is false.

(b) Statement 1 is true and statement 2 is false then statement 3 is true

(c) Statement 1 is true, statement 2 is true and statement 3 true

(d) Statement 1 is false, statement 2 is false and statement 3 is true.

Sol. *(c)*

3. Her _____ should not be confused with miserliness because she is ever willing to assit those in need.

Sol. Frugality

4. If by decreasing length of rectangle by 10 m and breath by 5m it becomes a square. The area lost from rectangle is 650 m^2. The area of original rectangle?

Sol. 2250

5. If a and b are integers and $a + a^2b^3$ is odd then

(a) a and b even (b) a and b odd

(c) a odd b even (d) a even b odd

Sol. *(c)*

6. 7 machines take 7 min to make 7 identical toys. At the same rate how many minutes would it take for 100 machines to make 100 toys?

Sol. 7 minutes

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7. A number consists of 2 digits, the sum of digits is 9. If 45 is subtracted from the number its digits are interchange. What is the number?

(a) 55 (b) 60

(c) 85 (d) 72

Sol. ***(d)***

8. For integers a, b, c, minimum and maximum of a + b + c

If log|a| + log|b| + log|c| = 0

(a) –2 and 2 (b) –1 and 1

(c) –3 and 3 (d) None of these

Sol. –3 and 3

9. From the time, the front of a train enters a platform it take 25 sec for back of the train to leave the platform, if train is travelling at 54 km/hr. At the same speed it takes 14 sec to pass a man running at 9 km/h in same direction of the train. Length of train and platform in m is?

(a) 175 and 250 (b) 200 and 275

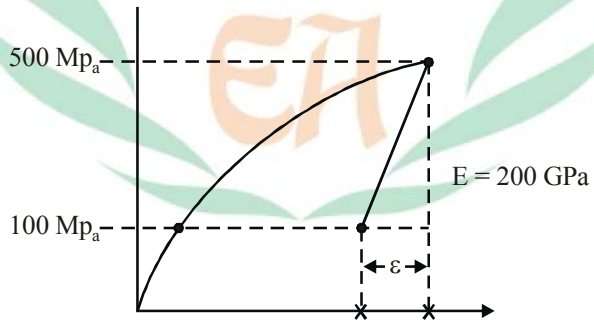
(c) 175 and 200 (d) None of these

Sol. *(c)*

10. Going by the _____ that many hands make light work, the school _____ involved all the students in the task.

Sol. Principle, Principal

11.



Sol. Recovered strain

$$\varepsilon_1 = \frac{\sigma_2 - \sigma_1}{E}$$

$$= \frac{400 \times 10^6}{200 \times 10^9}$$

$$\Rightarrow \quad \varepsilon = 0.5 - \varepsilon_1$$

$$= 0.498$$

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12. A bar is compressed half to its original length. The value of true strain is

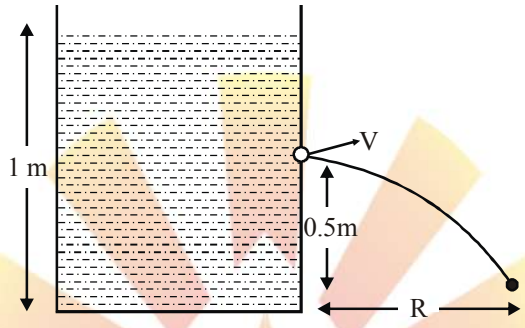
Sol. $$e_T = ln\ (1 + \varepsilon) = ln\left(1 - \frac{1}{2}\right)$$

$$= -\ 0.6931$$

13. In a f_{cc} structure, how many atoms per unit cell and slip system is

Sol. (4, 12)

14. The value R is



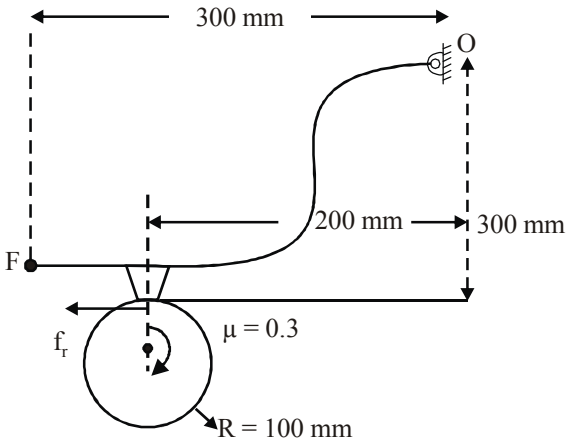
Sol. $$V = \sqrt{290.5}$$

$$0.5 = 0 + \frac{1}{\alpha} gt^2$$

$$R = V * t$$

$$= \sqrt{g} * \frac{1}{\sqrt{g}} = 1m$$

15. Find the breaking torque F = 100 N



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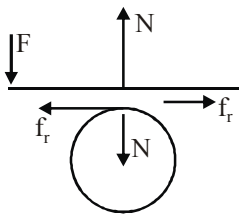


Sol. Balancing torque about 0 – 0

$$F \times 3\phi\phi = \mu N \times 3\phi\phi = N * 2\phi\phi$$

$$3F = (2 - 0.9)N$$

$$N = \left(\frac{300}{1.1}\right)$$

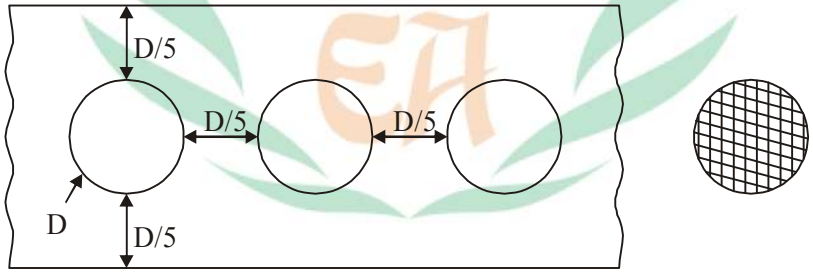
$$f_r = \mu N$$

Torque $T = f_r \times R$

$$= \left(\frac{300}{1.1}\right) \times 0.3 \times 100 \times 10^{-3}$$

$$= 8.181 \text{ N-m}$$

16. Blanking operations



Find the percentage of scrap

Sol. Area w. p $= \left(\frac{2D + D}{5}\right)\left(3D\frac{BD}{5}\right)$

$$\left(\frac{36D^2}{25}\right) = \left(\frac{7D}{5}\right).\left(\frac{180}{5}\right) = 5.04D^2$$

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Blank Area $= \frac{3\pi}{4}D^2$

Strap area $= \left(\frac{36}{25}D^2 - \frac{3}{4}\pi D^2\right)$

$= 2.6838\ D^2$

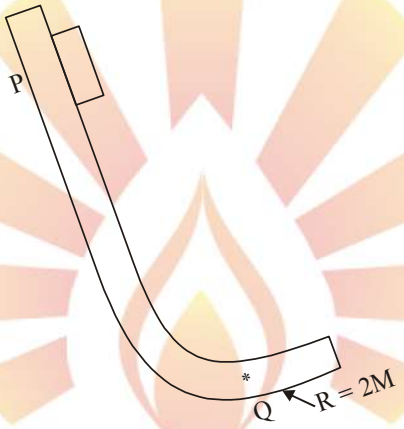
% strap $= 52.25\ \%$

17. Velocity of point Q $= 20^{m-1}$

$M = 2$ kg

Radius of armature $= 2$ m

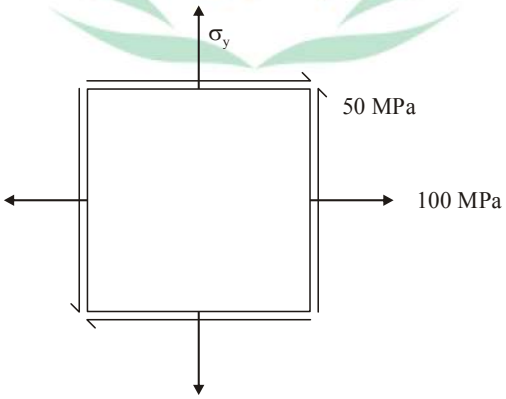
Find the normal force at Q



Sol. $F = \frac{mv^2}{R} = \frac{2 \times 20 \times 20}{2}$

$= 400$ N

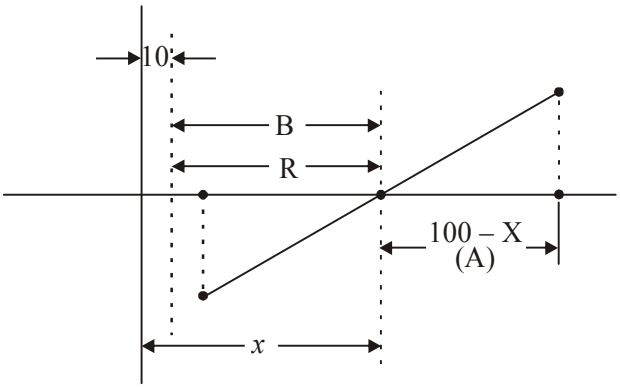
18.



If minimum principle stress is $\sigma = 10$ mPa

The σ_y is

Sol.



$x = 10 = R$

$X = R + 10$

$R^2 = (100 - x)^2 + (50)^2$

$R^2 = (R + 10 - 100)^2 + (50)^2$

$R^2 = R^2 = (90)^2 - 180R + (50)^2$

$180R = (90)^2 + (50)^2$

$R = 58.88$ Mpa

$x = 68.88$ MPa

$\Rightarrow$ $(100 - x) = A$

$A = 100 - 68.88$

$A = 31.111$

$B = 100 - 2A$

$= 37.77$ N

19. Enthalpy at the inlet of Nozzle is 2500 kH/kg and at the exit is 2350 kJ/kg. Maximum flow rate is 0.5 kg/sec. And heat lost from the Nozzle at a rate of 25 kW. The velocity at exit is _____ (m^{-1})

Sol.

$$0.5\left(\frac{2500}{10^3}\right) = 0.5\left(\frac{2500}{10^3}\right) + \frac{25}{*10^3} + \frac{V_1^2}{2}$$

$V = 316.227$ m^{-1}

20. If a fair dice with 6 face is thrown 5 times, than the probability that "one" is obtained at least 4 times. (in percentage)

Sol. $$P(x = 4) = \left(\frac{56}{46}\right) * \left(\frac{1}{6}\right)^4 * \frac{5}{6}$$

$$P\ (x = 5) = \left(\frac{1}{6}\right)^5$$

0.334 %

21. 4 Red, 4 blue and 4 yellow ball are kep in a bag. If three ball are taken from the bag one bye one without replacemnt. The probability that all balls are red is

Sol. $$P = \frac{4}{12} \times \frac{3}{11} \times \frac{2}{10} = \frac{1}{110}$$

Once again we proved

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