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Material Science

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CLASS TEST 2019-2020

MECHANICAL ENGINEERING

Date of Test : 16/06/2019

ANSWER KEY ➤ Material Science

1.	(c)	7.	(a)	13.	(b)	19.	(d)	25.	(d)
2.	(c)	8.	(a)	14.	(d)	20.	(d)	26.	(b)
3.	(b)	9.	(a)	15.	(c)	21.	(d)	27.	(c)
4.	(a)	10.	(a)	16.	(b)	22.	(b)	28.	(c)
5.	(b)	11.	(b)	17.	(c)	23.	(a)	29.	(a)
6.	(a)	12.	(a)	18.	(c)	24.	(a)	30.	(b)

Detailed Explanations

1. (c)

Hardness and strength of steels obtained after normalizing process are higher than those obtained by annealing process.

6. (a)

$$BHN = \frac{2P}{\pi D\left[D-\sqrt{D^2-d^2}\right]} = \frac{2\times 500}{\pi\times 10\left[10-\sqrt{10^2-1.64^2}\right]}$$

$$= 235 \text{ kg/mm}^2$$

11. (b)

Eutectoid is made of 0.8 % C, in iron-iron carbide diagram.

$$\text{Proeutectoid cementite} = \frac{1.4-0.8}{6.67-0.8} = 0.1022 \simeq 0.10$$

12. (a)

$$\sigma_T = \sigma_o + K\varepsilon_T^n \quad \text{...(i)}$$

$$\Rightarrow \quad \frac{d\sigma_T}{d\varepsilon_T} = 0 + K\cdot n\cdot\varepsilon_T^{n-1}$$

$$= Kn\varepsilon_T^{n-1} \quad \text{...(ii)}$$

From equation (i)

$$K = \frac{\sigma_T-\sigma_O}{\left(\varepsilon_T\right)^n}$$

Substituting the above value in equation (ii)

$$\frac{d\sigma_T}{d\varepsilon_T} = \left(\frac{\sigma_T-\sigma_O}{\varepsilon_T^n}\right)\left(n\,\varepsilon_T^{(n-1)}\right) = \frac{(\sigma_T-\sigma_O)n}{\varepsilon_T}$$

$$= \frac{(300-200)\times 0.3}{0.05} = 600 \text{ MPa}$$

13. (b)

Behaviour of wishkers are **elastic** so the statement 3 is wrong.

15. (c)

Silicon is used for promoting graphitization in cast irons.

19. (d)

Cast Iron shows brittle failure and have better ability to damp vibration.

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