BPSC TEST

Date: 09 March, 2019

TEST 06 (OBJECTIVE SOLUTION)...

ANSWERS

1.	(a)	11.	(d)	21.	(b)	31.	(c)	41.	(b)
2.	(c)	12.	(d)	22.	(b)	32.	(b)	42.	(b)
3.	(b)	13.	(a)	23.	(a)	33.	(b)	43.	(d)
4.	(c)	14.	(c)	24.	(c)	34.	(c)	44.	(c)
5.	(b)	15.	(b)	25.	(a)	35.	(a)	45.	(a)
6.	(c)	16.	(d)	26.	(b)	36.	(c)	46.	(c)
7.	(a)	17.	(b)	27.	(b)	37.	(c)	47.	(b)
8.	(d)	18.	(d)	28.	(c)	38.	(b)	48.	(a)
9.	(c)	19.	(b)	29.	(c)	39.	(c)	49.	(a)
10.	(a)	20.	(b)	30.	(c)	40.	(a)	50.	(d)

BPSC TEST-06 Solutions
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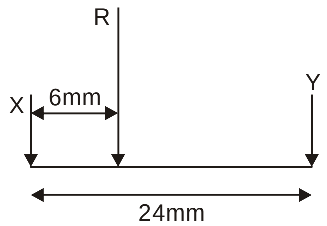
1. **(a)**



$$X + Y = 20 \text{ N}$$

Also, $X \times 6 = Y \times 18$

or, $X = 3Y$

$\therefore$ $X + Y = 20 \text{ N}$

or, $4Y = 20 \text{ N}$

$Y = 5 \text{ N}$

and $X = 15 \text{ N}$

2. **(c)**

3. **(b)**

$$R = V_0^2 \times \frac{\sin 2\theta}{g}$$

For R to be max,

$$\theta = 45°$$

$$\therefore \quad R_{max} = \frac{V_0^2}{g}$$

4. **(c)**

Coefficient of restitution,

$$= \frac{\text{Velocity of seperation}}{\text{Velocity of approach}}$$

$$= \frac{V_2 - V_1}{U_1 - U_2}$$

5. **(b)**

6. **(c)**

$$\text{Angular acceleration} = \frac{d^2\theta}{dt^2}$$

$$= 12t - 6$$

At t = 1 sec,

Angular acceleration = $12 \times 1 - 6 = 6 \text{ rad/sec}^2$

7. **(a)**

8. **(d)**

Invar tape consists of 64% steel and 36% nickel.

9. **(c)**

Included angle = F.B of next line – B.B of previous line

$= 15° - (35° + 180°)$

$= 160°$

10. **(a)**

R.L. of forward station

$= 100 + 1.215 - 1.870$

$= 99.345 \text{ m}$

11. **(d)**

12. **(d)**

13. **(a)**

Resistance is zero,

$\therefore$ From, $P = I^2R$

$P = I^2 \times 0$

$= 0$

14. **(c)**

From maximum principal strain theory,

$$\frac{\sigma_1 - \mu\sigma_2}{E} = \frac{\sigma_E}{E}$$

$$\text{or} \quad \frac{800 - 0.25 \times 400}{E} = \frac{\sigma_E}{E}$$

$$\therefore \quad \sigma_E = 700 \text{ kg/cm}^2$$

15. **(b)**

16. **(d)**

Maximum shear stress

$$= \frac{3}{2} \times \tau_{avg}$$

$$= \frac{3}{2} \times \frac{V}{B \times D}$$

$$= \frac{3}{2} \times \frac{20000}{100 \times 200}$$

$$= 1.5 \text{ N/mm}^2$$

17. (b)

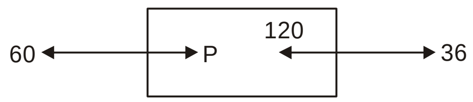
We know, $P_e = \dfrac{\pi^2 EI}{(l_{eff})^2}$

For fixed column, leff = $0.5l$

$\therefore \quad Pe = \dfrac{4\pi^2 EI}{l^2}$

18. (d)

Free body diagram of portion BC



For equilibrium,

$$P + 36 = 120 + 60$$

$$P = 144 \text{ kN}$$

19. (b)

Gauge factor, $G = \dfrac{dR}{R}\left[\dfrac{1}{\text{strain}}\right]$

or, $G = \dfrac{1}{125} \times \left[\dfrac{1}{4000 \times 10^{-6}}\right]$

or, $G = 2$

20. (b)

21. (b)

22. (b)

23. (a)

24. (c)

Standard size of modular brick = $(20 \times 10 \times 10)\text{cm}^3$

$\therefore$ No. of bricks required per 1 cubic metre

$$= \frac{1}{0.2 \times 0.1 \times 0.1}$$

= 500 bricks

25. (a)

$$\text{hoop stress} = \frac{pd}{2t}$$

$$\text{Longitudinal stress} = \frac{pd}{4t}$$

$$\therefore \quad \frac{\text{Longitudinal stress}}{\text{hoop stress}} = \frac{pd}{4t} \times \frac{2t}{pd}$$

$$= \frac{1}{2}$$

$$= 0.5$$

26. (b)

27. (b)

28. (c)

PERT follows a probabilistic approach and is therefore used in research and development projects where there is uncertainty in time estimation.

29. (c)

In resource smoothening, total project duration is not changed but activities having floats are rescheduled to produce an uniform demand for resources.

30. (c)

31. (c)

32. (b)

For floating condition,

Weight of block = weight of water displaced by block

= (2 × 1 × 0.5) × 10

= 10 kN

33. (b)

$$\frac{T_m}{T_p} = \sqrt{L_r}$$

or, $\dfrac{T_m}{12} = \sqrt{\dfrac{1}{100}}$

or, $T_m = 12 \times \frac{1}{10}$

$= 1.2$ hours

34. **(c)**

$$\frac{\delta}{x} = \frac{0.376}{(Re_x)^{1/5}}$$

or, $\delta \propto x^{1-1/5}$

or, $\delta \propto x^{4/5}$

35. **(a)**

Prandtl mixing length = 0.4 × y

Where, y = distance from pipe wall

36. **(c)**

We know, $U = \frac{1}{2\mu}\left(-\frac{dp}{dx}\right)(By - y^2)$

On comparing with $U = (2y - y^2)$

We have, B = 2m

& $\frac{1}{2\mu} \times \left(-\frac{dp}{dx}\right) = 1$

$\therefore -\frac{dp}{dx} = 1 \times 2\mu = \frac{2 \times 8.6}{10}$

now, $\tau = -\frac{dp}{dx}\left(\frac{B}{2} - y\right)$

$= \frac{2 \times 8.6}{10} \times \left(\frac{2}{2} - 0.15\right)$

$= 14.62$ N/m^2

37. **(c)**

Open cycle gas turbine works on Brayton cycle, or Joule's cycle, which consists of two constant pressure and two isentropic process.

38. **(b)**

39. **(c)**

R = 1.2 kΩ

V = 12 volts

$$P = \frac{V^2}{R} = \frac{12^2}{(1.2 \times 1000)}$$

= 0.12 watt

40. **(a)**

Thevenin's theorem works only for linear circuit elements and not non-linear ones such as BJT, semiconductors etc.

41. **(b)**

By law of parallel circuits,

$$\frac{1}{R} + \frac{1}{2000} = \frac{1}{1403}$$

or, $R = \frac{2000 \times 1403}{2000 - 1403}$

= 4.7kΩ

42. **(b)**

$$N_s = \frac{N\sqrt{Q}}{H^{3/4}}$$

$$= \frac{725 \times \sqrt{1}}{16^{3/4}}$$

$$= \frac{725}{8}$$

= 90.625 rpm

43. **(d)**

44. **(c)**

45. **(a)**

46. **(c)**

47. **(b)**

Let new quantity of sludge with moisture constant 96% be Y

we have

Y(100 – 96) = X(100 – 98)

Y × 4 = X × 2

or, $Y = \frac{X}{2}$

48. **(a)**

49. **(a)**

50. **(d)**