PRE-MEDICAL : LEADER TEST SERIES / JOINT PACKAGE COURSE

TARGET : PRE-MEDICAL 2020

Test Type : **MAJOR TEST # 01** Test Pattern : **NEET(UG)**

TEST DATE : 21 - 07 - 2020

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	1	1	3	1	3	4	3	2	3	2	4	3	4	4	2	2	2	1	3	3
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	2	4	2	1	3	3	2	1	2	2	1	3	3	4	1	2	3	3	2	2
Que.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	4	4	1	2	3	3	3	4	4	2	3	2	1	2	4	3	3	2	4	4
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	3	4	3	2	3	4	4	1	1	4	3	3	4	4	4	2	3	4	2	1
Que.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans.	3	4	3	1	1	3	4	1	1	4	3	3	1	2	1	1	3	2	1	3
Que.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	2	4	1	2	3	4	2	4	2	4	3	1	2	3	2	2	4	1	3	3
Que.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Ans.	3	3	1	2	3	2	4	3	3	1	4	1	3	4	2	2	3	4	1	2
Que.	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Ans.	1	3	2	2	4	3	3	4	1	1	4	2	1	2	3	3	1	2	2	2
Que.	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans.	2	2	4	2	3	1	2	2	4	3	2	2	2	3	3	3	2	4	1	2

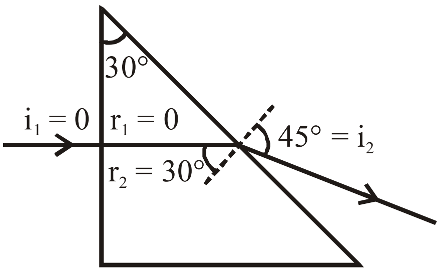
HINT – SHEET

1. $\vec{A} = 4\hat{i} + 6\hat{j}$

$\vec{B} = 2\hat{i} + 3\hat{j}$

$\frac{4}{2} = \frac{6}{3} \Rightarrow$ $\vec{A}$ is parallel to $\vec{B}$

2.



$\sqrt{2} \times \sin 30° = 1 \times \sin i_2$

$i_2 = 45°$

$\delta = i_1 + i_2 - A$

$= 0° + 45° - 30° = 15°$

3. $B_{arc} = \frac{\mu_0 I\alpha}{4\pi R}$

4. $F_{net} = 0$

5. $V_{rms} = \sqrt{\frac{3RT}{M_W}}$

6. COLM $mu + 0 = 2mV_C$

$V_c = \frac{u}{2}$

By COME $\frac{1}{2}(2m)V_c^2 = 2mgh$

$h = \frac{v_c^2}{2g} = \frac{u^2}{8g} = \frac{1}{80}m = 1.25$ cm

7. use $t=\sqrt{\frac{2h}{g}}$

8. $\Delta x = x_{7d} - x_{3d}$

$= \frac{13\lambda D}{2d} - \frac{5\lambda D}{2d} = \frac{4\lambda D}{d}$

$= \frac{4\times 6.5\times 10^{-7}\times 1}{1\times 10^{-3}}$

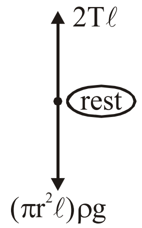
$= 2.6$ mm

9. $r=\frac{\sqrt{2mqV_{acc.}}}{qB}$

10. $\frac{1}{2}CV^2 = m.s\Delta T \Rightarrow V = \sqrt{\frac{2ms\Delta T}{C}}$

11. Time period of mass oscillating on a spring is independent of g.

12.



for max dimetere $\boxed{\cos\theta = 1}$

$2T\ell = \pi r^2\ell\rho g$

$r = \sqrt{\frac{2T}{\pi\rho g}} = \sqrt{\frac{2\times 0.07}{\pi\times 8\times 10^4}} = \sqrt{\frac{7\times 10^{-6}}{12.56}} = 0.74$ mm

$d = 2r = 1.48$ mm

13. 1 ms^{-2}

$20 \leftarrow \boxed{M} \rightarrow T$

$F - T = m.a$

$20 - T = 6\ (1)$

$T = 14$ N

14. Initially $P \rightarrow 4N_0$; $Q \rightarrow N_0$

Half life $T_p = 1$ min ; $T_Q = 2$ min

Let after time t number of nuclei of P and Q are equal that is $\frac{4N_0}{2^{t/1}} = \frac{N_0}{2^{t/2}}$

or $\frac{4}{2^{t/2}} = 1$ or $t = 4$ min

so at $t = 4$ min

$N_p = \frac{(4N_0)}{2^{t/2}} = \frac{N_0}{4}$

at $t = 4$ min. $N_Q = \frac{N_0}{2^{4/2}} = \frac{N_0}{4}$

or no. of nuclei of R $= \left(4N_0 - \frac{N_0}{4}\right) + \left(N_0 - \frac{N_0}{4}\right)$

$= \frac{9N_0}{2}$

15. $E\cdot 2\pi r = \left|\pi r^2\frac{dB}{dt}\right|$

$E \propto r$

16. $V = V_0(e^{-\lambda t})$

After 1 seconds

$V_1 = 320(e^{-\lambda}) \Rightarrow 240 = 320(e^{-\lambda}) \Rightarrow e^{-\lambda} = \frac{3}{4}$

After 2 seconds

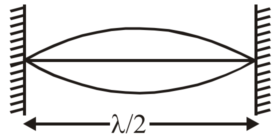
$V_2 = 320(e^{-\lambda})^2 = 320 \times \left(\frac{3}{4}\right)^2$ m $= 180$ volts

After 3 seconds

$V_3 = 320\ (e^{-\lambda})^3 = 320 \times \left(\frac{3}{4}\right)^3 = 135$ volt

17. For max. wavelength

$\frac{\lambda}{2} = L$



$\lambda = 2L$

$\lambda = 80$cm

18. Temperature on any scale can be converted into other scale by $\frac{x - LFP}{UFP - LFP}$ = Constant for all scales $\frac{x-20}{150-20} = \frac{60}{100} \Rightarrow x = 98°C$

19. When KE is doubled, the stopping distance will be doubled for the same retarding force F.

20. $y = \overline{\overline{A}+\overline{B}} = AB$

Given figure is equivalent to AND gate.

21. Pressure $= \frac{2I}{c}$, force $= \frac{2IA}{c}$

Momentum transferred in time $t = \text{force}\times t = \frac{2IAt}{c}$

Total energy $E = IAt$

So momentum transferred $= \frac{2E}{c}$

22. $I = \frac{4}{1+2+1+4} = \frac{1}{2} = 0.5\,A$

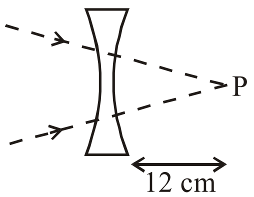
23. According to Kepler's second Law, equal areas are swept in equal intervals of time.
As SCD = 2 area SAB, hence ($t_1 = 2t_2$)

24. For A to B $V \propto T$, P = constant
A to B is isobaric expansion
For B to C, V = constant, T↓ so P↓
For C to A, T = const.,V↓
So option (1)

25. $\therefore\ \alpha = \frac{\tau}{I} = \frac{TR}{\frac{1}{2}MR^2} = \frac{2TR}{MR^2} = \frac{2T}{MR}$

26. $|\vec{a}_{avg.}| = \frac{|\Delta\vec{v}|}{t} = \frac{2V\sin\left(\frac{180°}{2}\right)}{\frac{\pi r}{V}} = \frac{2V^2}{\pi r}$

27.



$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$\frac{1}{v} - \frac{1}{12} = \frac{1}{-16}$

v = 48 cm

28. Force per unit length $F = \frac{\mu_0 I_1 I_2}{2\pi d}$

On 10 cm length of wire

$F_{net} = (0.1)F = (0.1)\left[\frac{2\times10^{-7}\times12}{2} - \frac{2\times10^{-7}\times8}{3}\right]$

$\approx 6\times10^{-8}N$

29. $R = \frac{\rho\ell}{A}$

30. Acceleration of car is

$a = \frac{d^2x}{dt^2} = g\sqrt{3}$

$g_{eff.} = \sqrt{g^2 + \left(g\sqrt{3}\right)^2} = 2g$

$T = 2\pi\sqrt{\frac{\ell}{g_{eff.}}} = \pi\sqrt{\frac{2\ell}{g}}$

31. $V = K\sqrt{s}$

$\frac{ds}{dt} = K\sqrt{s}$

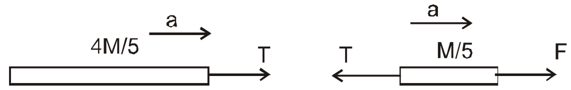
$\int_0^s \frac{1}{\sqrt{s}}ds = \int_0^t k\,dt$

$\sqrt{s} = \frac{kt}{2} \Rightarrow V = \frac{k^2t}{2}$

By WET $W = \frac{1}{2}mv^2$

$= \frac{1}{2}m\left(\frac{k^4t^2}{4}\right) = \frac{1}{8}mk^4t^2$

32.



Equation of motion

$F - T = \frac{M}{5}\times a$ ....(1)

$T = \frac{4M}{5}\times a$ ....(2)

Solving (1) and (2)

T = 4 N

33. K.E. = 2 $E_0 - E_0 = E_0$ (for $0 \le x \le 1$) $\Rightarrow \lambda_1 = \frac{h}{\sqrt{2mE_0}}$

K.E. = 2 E_0 (for x>1) $\Rightarrow \lambda_2 = \frac{h}{\sqrt{4mE_0}} \Rightarrow \frac{\lambda_1}{\lambda_2} = \sqrt{2}$

34. $\varepsilon = \left|-L\frac{dI}{dt}\right| \Rightarrow 8 = L \propto \frac{4}{0.05}$

$\Rightarrow L = 0.1\ H$

35. During the growth of voltage in a C-R circuit the voltage across a capacitor at time t is given by $V = V_0\left(1 - e^{\frac{t}{CR}}\right)$ for the given circuit as per given conduction at time t.

$V = \frac{3}{4}$th of the voltage applied across $C = \frac{3}{4}V_0$

So, $\frac{3}{4}V_0 = V_0\left(1 - e^{\frac{t}{RC}}\right)$

$\Rightarrow e^{\frac{t}{RC}} = \frac{1}{4} \Rightarrow e^{\frac{t}{RC}} = 2^2$

$\Rightarrow t = 2RC \ln 2$

$= 2 \times (2.5 \times 10^6) \times (4 \times 10^{-6}) \times (0.693) = 13.86\,s$

36. $y = a \sin(\omega t - kx)$

If it meets another wave producing a node at $x = 0$ then, it can be reflection at rigid end, then

$y_r = a \sin(\omega t + kx + \pi) = -a \sin(\omega t + kx)$

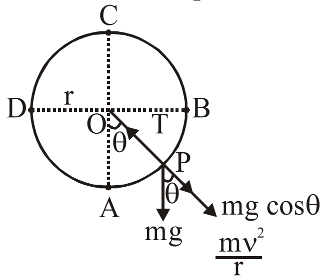
37. As mg = Buoyant force

mg $\rho v_s g$, (v_s = volume submerged)

Here no change in m so v_s remain unchanged.

38. Net force towards centre = centripetal force

$$T - mg\cos\theta = \frac{mv^2}{r}$$

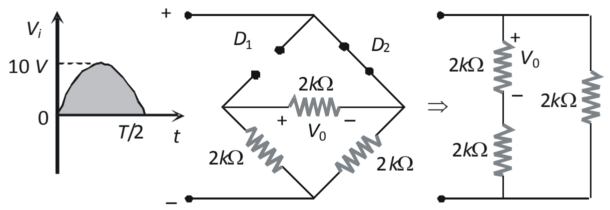


At point C ; $\theta = 180°$

$\therefore \quad T + mg = \frac{mv^2}{r}$

or $\quad mg < \frac{mv^2}{r}$

39. For the positive half cycle of input the resulting network is shown below



$$\Rightarrow (V_0)_{max} = \frac{1}{2}(V_i)_{max} = \frac{1}{2} \times 10 = 5\,V.$$

40. V_r = 220 V, for device P, I_P = 0.25 A leads then voltage by angle $\pi/2$

It means R = 0, circuit is purely capacitive, $Z_1 = X_c$

For device Q, V_r = 220V

I_Q = 0.25 A, & in same phase with applied voltage

So $Z_2 = R = X_C$

If P & Q are series,

$$Z_3 = \sqrt{R^2 + X_C^2} = \sqrt{2}R = \sqrt{2}X_C$$

$$I_3 = \frac{V_r}{\sqrt{2}R} = \frac{0.25}{\sqrt{2}} = \frac{1}{4\sqrt{2}}$$

$$\tan\phi = \frac{X_C}{R} = 1, \quad \phi = \frac{\pi}{4}$$

current leading in phase by $\frac{\pi}{4}$ with voltage.

41. $V_A - V_B = 1.5 \times 1$

$V_A - V_B = 1.5$

$V_A - 0 = 1.5$

$V_A = 1.5$ V

$V_B - 2.5 \times 1 + 2 - V_D = 0$

$V_B - V_D - .5 = 0$

$0 - V_D = .5$

$V_D = -0.5$ V

42. $f' = f\left[\frac{v - v_0}{v - v_s}\right]$

$$f' = f\left[\frac{v + v/s}{v}\right]$$

$$f' = \frac{6f}{5}$$

Percentage increase = $\frac{f' - f}{f} \times 100 = 20\%$

43. $\frac{E_2}{E_1} = \left(\frac{T_2}{T_1}\right)^4 \Rightarrow \frac{T_2}{T_1} = \left(\frac{E_2}{E_1}\right)^{1/4} = \left(\frac{10^9}{10^5}\right)^{1/4} = 10$

$\Rightarrow T_2 = 10T_1 = 10 \times (273 + 227) = 5000\,K$

44. Moment of inertia of a cylinder about an axis passing through centre and normal to circular face = $\frac{MR^2}{2}$

Moment of inertia of a cylinder about an axis passing through centre and normal to its length.

$$= M\left[\frac{L^2}{12} + \frac{R^2}{4}\right]$$

But $\quad \frac{MR^2}{2} = M\left[\frac{L^2}{12} + \frac{R^2}{4}\right]$

or $\quad \frac{R^2}{2} = \frac{L^2}{12} + \frac{R^2}{4}$

or $\quad \frac{R^2}{4} = \frac{L^2}{12}$

$\therefore \quad L = \sqrt{3}R$

45. $\because \beta = \frac{I_C}{I_B}$

$I_C = (\beta) I_B$

$= (50)(40 \times 10^{-6})$

$= 2 \times 10^{-3}$ amp

$V_0 = (I_C)(R_L)$

$V_0 = (2 \times 10^{-3})(3 \times 10^3)$

V_0 = 6V