WEEKLY TEST TYJ-01 R & B SOLUTION 17 AUGUST 2019

PHYSICS

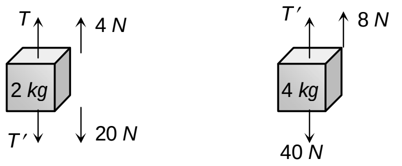
1. (d) Application of Bernoulli's theorem.

2. (c)

3. (b) $F = \sqrt{(F)^2 + (F)^2 + 2F.F\cos\theta} \Rightarrow \theta = 120°$

4. (d) Range of resultant of F_1 and F_2 varies between $(3+5)=8N$ and $(5-3)=2N$. It means for some value of angle (θ), resultant 6 can be obtained. So, the resultant of $3N$, $5N$ and $6N$ may be zero and the forces may be in equilibrium

5. (a) FBD of mass 2 *kg* FBD of mass 4*kg*



$T - T' - 20 = 4$ ....(i) $T' - 40 = 8$ ...(ii)

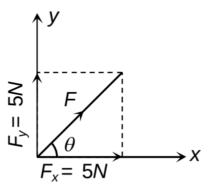
By solving (i) and (ii) $T' = 47.23\,N$ and $T = 70.8\,N$

6. (a)

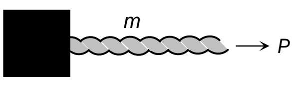
7. (b) $|\vec{F}| = \sqrt{5^2 + 5^2} = 5\sqrt{2}\ N.$

and $\tan\theta = \frac{5}{5} = 1$

$\Rightarrow \theta = \pi/4.$



8. (c)



Acceleration of the system $= \frac{P}{m+M}$

The force exerted by rope on the mass $= \frac{MP}{m+M}$

9. (c) Acceleration $= \frac{(m_2 - m_1)}{(m_2 + m_1)}g$

$= \frac{4-3}{4+3} \times 9.8 = \frac{9.8}{7} = 1.4\,m/\sec^2$

10. (a) Acceleration $= \frac{m_2}{m_1+m_2} \times g = \frac{1}{2+1} \times 9.8 = 3.27\ m/s^2$

and $T = m_1 a = 2 \times 3.27 = 6.54\ N$

11. (d) $T = \frac{2m_1 m_2}{m_1+m_2} g = \frac{2 \times 10 \times 6}{10+6} \times 9.8 = 73.5N$

12. (b) $a = \frac{m_2}{m_1+m_2} g = \frac{3}{7+3} 10 = 3\, m/s^2$

13. (c) $T_1 = \left(\frac{m_2+m_3}{m_1+m_2+m_3}\right) g = \frac{3+5}{2+3+5} \times 10 = 8N$

14. (c) $T \sin 30 = 2kg\ wt$

$\Rightarrow T = 4\ kg\ wt$

$T_1 = T \cos 30^{\circ}$

$= 4 \cos 30^{\circ}$

$= 2\sqrt{3}$

15. (b) $a = \left(\frac{m_1 - m_2}{m_1 + m_2}\right) g \Rightarrow \frac{g}{8} = \left(\frac{m_1 - m_2}{m_1 + m_2}\right) g \Rightarrow \frac{m_1}{m_2} = \frac{9}{7}$

MATHEMATICS

31. (a) Sum of the digits in the unit place is $6(2+4+6+8) = 120$ units. Similarly, sum of digits in ten place is 120 tens and in hundredth place is 120 hundreds etc. Sum of all the 24 numbers is

$120(1+10+10^2+10^3) = 120 \times 1111 = 133320$.

32. (b) Extreme left place can be filled in 6 ways, the middle place can be filled in 6 ways and extreme right place in only 3 ways.

($\because$ number to be formed is odd)

$\therefore$Required number of numbers = 6 × 6 × 3 = 108.

33. (b) Numbers greater than 1000 and less than or equal to 4000 will be of 4 digits and will have either 1 (except 1000) or 2 or 3 in the first place with 0 in each of remaining places.

After fixing 1^{st} place, the second place can be filled by any of the 5 numbers. Similarly third place can be filled up in 5 ways and 4^{th} place can be filled up in 5 ways. Thus there will be $5 \times 5 \times 5 = 125$ ways in which 1 will be in first place but this include 1000 also hence there will be 124 numbers having 1 in the first place. Similarly 125 for each 2 or 3. One number will be in which 4 in the first place and *i.e.* 4000. Hence the required numbers are $124 + 125 + 125 + 1 = 375$ ways.

34. (d) Using the digits 0, 1, 2, ..., 9 the number of five digit telephone numbers which can be formed is 10^5 (since repetition is allowed)

The number of five digit telephone, numbers which have none of the digits repeated = ${}^{10}P_5 = 30240$.

$\therefore$ The required number of telephone numbers

= $10^5 - 30240 = 69760$.

35. (c) Words start with D are $6! = 720$, start with E are 720, start with MD are $5! = 120$ and start with ME are 120.

Now the first word starts with MO is nothing but MODESTY. Hence rank of MODESTY is 1681.

36. (a) Total no. of permutations $= \frac{6!}{3!\,2!} = 60$.

37. (b) Numbers which are divisible by 5 have '5' fixed in extreme right place

3 Digit Numbers			4 Digit Numbers			
H	T	U	Th	H	T	U
×	×	5	×	×	×	5
$^3P_2$ ways			$^3P_3$ ways			
$= \frac{3!}{1!} = 3\times 2$			$= \frac{3!}{0!} = 3\times 2$			

$\Rightarrow$ Total ways = 12.

38. (c) Out of 7 places, 4 places are odd and 3 even. Therefore 3 vowels can be arranged in 3 even places in $^3P_3$ ways and remaining 4 consonants can be arranged in 4 odd places in $^4P_4$ ways.

Hence required no. of ways = $^3P_3 \times {^4P_4} = 144$.

39. (b) Fix up 1 man and the remaining 6 men can be seated in 6! ways. Now no two women are to sit together and as such the 7 women are to be arranged in seven empty seats between two consecutive men and number of arrangement will be 7!. Hence by fundamental theorem the total number of ways = 7! × 6!.

40. (d) $^{n^2-n}C_2 = {^{n^2-n}C_{10}} \Rightarrow {^{n^2-n}C_{n^2-n-2}} = {^{n^2-n}C_{10}}$

$\Rightarrow n^2 - n - 2 = 10$ or $n = 4, -3$.

41. (a) $^{15}C_3 + {^{15}C_{13}} = {^{15}C_3} + {^{15}C_2} = {^{16}C_3}$.

42. (c) Required number of ways $= {^8C_1} + {^8C_2} + {^8C_3} + {^8C_4} + {^8C_5}$

$= 8 + 28 + 56 + 70 + 56 = 218$

{Since voter may vote to one, two, three, four or all candidates}.

43. (b) At least one green ball can be selected out of 5 green balls in $2^5 - 1$ *i.e.*, in 31 ways. Similarly at least one blue ball can be selected from 4 blue balls in $2^4 - 1 = 15$ ways. And at least one red or not red can be select in $2^3 = 8$ ways.

Hence required number of ways = $31 \times 15 \times 8 = 3720$.

44. (b) $^{14}C_4 + {^{14}C_3} + {^{15}C_3} + {^{16}C_3} + {^{17}C_3} = {^{18}C_4}$.

45. (a) Number of words of 5 letters in which letters have been repeated any times = 10^5

But number of words on taking 5 different letters out of $10 = {^{10}C_5} = 252$

$\therefore$ Required number of words = $10^5 - 252 = 99748$.