# FIITJEE

# NSEJS MOCK TEST – I

## Date: October 23, 2017
## QP CODE: 122937.0
## ANSWER KEYS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | **A** | 2. | **B** | 3. | **B** | 4. | **C** |
| 5. | **D** | 6. | **A** | 7. | **B** | 8. | **A** |
| 9. | **C** | 10. | **B** | 11. | **A** | 12. | **B** |
| 13. | **D** | 14. | **B** | 15. | **C** | 16. | **C** |
| 17. | **B** | 18. | **A** | 19. | **D** | 20. | **C** |
| 21. | **A** | 22. | **C** | 23. | **C** | 24. | **B** |
| 25. | **D** | 26. | **C** | 27. | **B** | 28. | **D** |
| 29. | **C** | 30. | **B** | 31. | **A** | 32. | **B** |
| 33. | **B** | 34. | **B** | 35. | **A** | 36. | **D** |
| 37. | **B** | 38. | **D** | 39. | **B** | 40. | **C** |
| 41. | **A** | 42. | **D** | 43. | **D** | 44. | **B** |
| 45. | **C** | 46. | **A** | 47. | **A** | 48. | **D** |
| 49. | **C** | 50. | **C** | 51. | **A** | 52. | **C** |
| 53. | **C** | 54. | **D** | 55. | **C** | 56. | **D** |
| 57. | **C** | 58. | **C** | 59. | **D** | 60. | **D** |
| 61. | **B** | 62. | **D** | 63. | **A** | 64. | **B** |
| 65. | **D** | 66. | **D** | 67. | **C** | 68. | **B** |
| 69. | **B** | 70. | **B** | 71. | **D** | 72. | **D** |
| 73. | **A** | 74. | **A** | 75. | **A** | 76. | **A** |
| 77. | **B** | 78. | **C** | 79. | **B** | 80. | **D** |

# HINTS AND SOLUTIONS

1. A

Sol. Given that $\frac{a}{b}=\frac{1}{3},\frac{b}{c}=2,\frac{c}{d}=\frac{1}{2},\frac{d}{e}=3$ and $\frac{e}{f}=\frac{1}{4}$

$\therefore \quad \frac{a}{b}\times\frac{b}{c}\times\frac{c}{d}=\frac{1}{3}\times 2\times\frac{1}{2}=\frac{1}{3}$

$\Rightarrow \quad \frac{a}{d}=\frac{1}{3}$ and $\frac{c}{d}\times\frac{d}{e}=\frac{1}{2}\times 3=\frac{3}{2}$

$\Rightarrow \quad \frac{c}{e}=\frac{3}{2}$

and $\frac{e}{f}\times\frac{d}{e}\times\frac{b}{c}\times\frac{c}{d}=\frac{1}{4}\times 3\times 2\times\frac{1}{2}=\frac{3}{4}$

$\Rightarrow \quad \frac{b}{f}=\frac{3}{4}$

$\therefore \quad \frac{abc}{def}=\frac{a}{d}\times\frac{c}{e}\times\frac{b}{f}=\frac{1}{3}\times\frac{3}{2}\times\frac{3}{4}=\frac{3}{8}$

2. B

Sol. Silver is concentrated by leaching.

3. B

Sol. Let $x=\sqrt{2\sqrt{2\sqrt{2\sqrt{2}.....\infty}}}$

Squaring both sides

$x^2=2\times\sqrt{2\sqrt{2\sqrt{2\sqrt{2}.....\infty}}}$

$\therefore \quad x^2=2x$

$\therefore \quad x=2.$

4. C

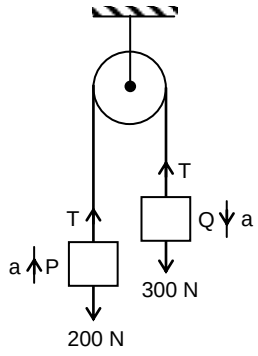
Sol. Heterotrophs are a group of microorganisms (yeast, moulds & bacteria) that use organic carbon as opposed food (as apposed to autotrophs like algae that use sunlight). Two economically important use of heterotrophic bacteria are

(1) Many bacteria like lactobacillus helps in the production of curd from milk.

(2) They act as decomposers and help in the formation of humus ex $\rightarrow$ Pseudomonas

5. **D**

Sol.




Body P will move up under tension force T.

6. A

Sol. $Mn^{2+}\longrightarrow Mn^{4+}+2e^{-}\left(\text{oxidation}\right)$

$3e^{-}+Mn^{7+}\longrightarrow Mn^{4+}+\left(\text{red}^{n}\right)$

$\therefore$ Meq of $KMnO_4$ = meq of $MnSO_4$

$N\times 16=20\times 0.2\times 2=N=0.5(N=M\times \text{n-factor})$

$\because M = \frac{0.5}{3} = 0.166$ [$\because$ n-factor for $KMnO_4$ = 3]

7. **B**

Sol. Let displacement and time taken are

$s_1, t_1$ – during acceleration.

$s_2, t_2$ – during uniform motion

$s_3, t_3$ – during retardation

$$s_1 = \frac{v^2}{2\alpha} \qquad s_2 = \frac{v^2}{2\beta} \qquad s_3 = \ell - (s_1 + s_2)$$

$$= \ell - \frac{v^2}{2}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$$

$$t_1 = \frac{v}{\alpha} \qquad t_2 = \frac{v}{\beta} \qquad t_3 = \frac{s_3}{v}$$

Total time = $t_1 + t_2 + t_3$.

8. **A**

Sol. The central dogma describes the two step process, transcription and translation, by which the information in genes flow into proteins:

$$DNA \xrightarrow{\text{Transcription}} RNA \xrightarrow{\text{Translation}} Protein$$

Transcription is the synthesis of an RNA copy of a segment of DNA.

The biggest revolution in the central dogma was the discovery of retrovirus, which transcribe RNA into DNA through the use of a special enzyme called reverse transcriptase.

$RNA \rightarrow DNA \rightarrow RNA \rightarrow$ Protein

9. C

Sol. If there is no acid in stomach, the carbohydrate digesting enzymes are active and continue to digest.

10. B

Sol. Since, each word is put off after a second, hence the required least time

$$= \text{LCM of } \left(\frac{5}{2}+1, \frac{17}{4}+1, \frac{41}{8}+1\right)$$

$$= \text{LCM of } \left(\frac{7}{2}, \frac{21}{4}, \frac{49}{8}\right)$$

$$= \frac{\text{LCM of } (7, 21, 49)}{\text{HCF of } (2, 4, 8)} = \frac{49 \times 3}{2} = 73.5 \text{ s}$$

11. A

Sol. Based on Le-Chatelier's principle.

12. **B**

Sol. Let x be the maximum depth, by work energy theorem

$Mg(h + x) = F_B x$

$\rho V_b(h + x) = \rho_1 V_b x$

$$x = \frac{h\rho}{\rho_1 - \rho}$$

13. **D**

Sol. Sound wave will reflect and refract also TIR may take place as for sound air is denser medium then concrete.

14. B

Sol. Isotones – Different element having same no. of neutrons known as isotones.

$^{76}_{32}Ge$ :- No. of neutron = 44, $^{77}_{33}As$ = No. of neutron = 44

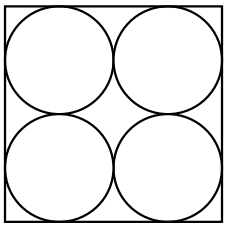
15. C

Sol. During exhalation the air passage will starts from
Alveoli → Bronchioles → Bronchus → Windpipe → Pharynx → Nasal passage.

16. C

Sol. Let R be the radius of each circle. Then, by given condition,

$$\frac{\pi R^2}{2\pi R} = \frac{2\pi R}{\pi R^2}$$



$\Rightarrow \quad R^2 = 4$

$\Rightarrow \quad R = 2$

$\therefore$ The length of the side of the square = 8

Now, the area covered by 4 coins

$$= 4 \times \pi(2)^2 = 16\pi$$

and area of the square = 64

$\therefore$ The area which is not covered by the coins

$= 64 - 16\pi = 16\,(4 - \pi)$

17. **B**

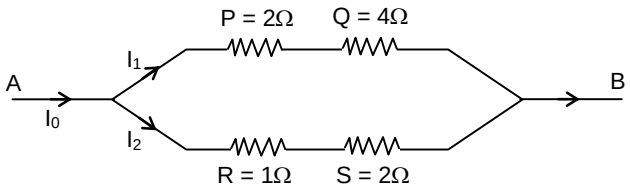
Sol. If we place a plant cell in hypotonic solution containing sucrose it will swell.

18. A

Sol. In $CO_2$ & $\overset{+}{N}O_2$ no. of $e^-$ is 22, i.e. isoelectronic, $CO_2$ & $NO_2^+$ have linear geometry so they are Isosters.

19. **D**

Sol.




$I_1 = \frac{I_0}{3}$

$I_2 = \frac{2}{3} I_0$

Heat generated. $H = I^2Rt$

$\therefore$ Heat is maximum for S.

20. **C**

Sol. For a person to see his full image in a plane mirror minimum size of mirror should be half the height of person. Convex mirror makes virtual and diminished image.

21. A

Sol. $a^2 + b^2 + c^2 = bc + ca + ab$

$\Rightarrow \quad a^2 + b^2 + c^2 - bc - ca - ab = 0$

$\Rightarrow \quad 2a^2 + 2b^2 + 2c^2 - 2bc - 2ca - 2ab = 0$

$\Rightarrow \quad (a - b)^2 + (b - c)^2 + (c - a)^2 = 0$

Sum of perfect square is 0

$\therefore$ all of them is 0.

$\Rightarrow \quad a - b = 0 = b - c = c - a$

$\Rightarrow \quad a = b = c$

$\therefore$ Triangle is equilateral.

22. C

Sol. pqr = 1 (given)

$$\frac{1}{1+p+q^{-1}} + \frac{1}{1+q+r^{-1}} + \frac{1}{1+r+p^{-1}}$$

$$= \frac{q}{q+pq+1} + \frac{r}{r+qr+1} + \frac{p}{p+pr+1}$$

$$= \frac{q}{q+\frac{1}{r}+1} + \frac{r}{r+\frac{1}{p}+1} + \frac{p}{p+pr+1}$$

$$= \frac{qr}{qr+1+r} + \frac{pr}{pr+1+p} + \frac{p}{p+pr+1}$$

$$= \frac{qr}{\frac{1}{p}+1+r} + \frac{pr}{pr+p+1} + \frac{p}{p+pr+1}$$

$$= \frac{pqr}{1+p+pr} + \frac{pr}{1+p+pr} + \frac{p}{1+p+pr}$$

$$= \frac{pqr+pr+p}{1+p+pr} = \frac{1+p+pr}{1+p+pr} = 1$$

23. C

Sol. $M_1V_1 = M_2V_2$

$0.2 \times 10 = M_2 \times 200$

$M_2 = 0.01$

$M_2V_2 = M_3V_3$

$M_3 = \frac{0.01 \times 100}{100} = 0.001$

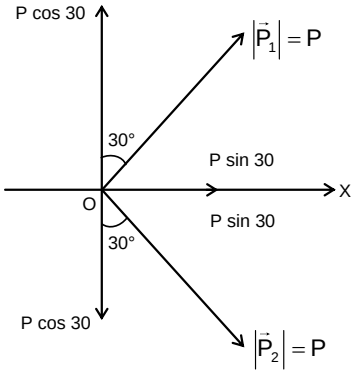
pH = 3

24. **B**

Sol. Resultant of these two forces = 2P sin 30 along + X-axis

$= 2P \times \frac{1}{2}$ = P along + X-axis.

$\therefore$ To keep body at rest, another force of magnitude P and direction –X-axis is required.




25. **D**

Sol. Distance travelled by car in 6 sec

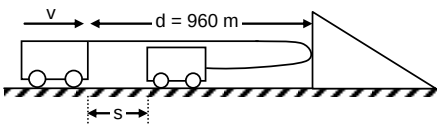
s = vt = 6 v …(1)

Now, distance travelled by sound

D = 2d – s

D = 1920 – 6v …(2)

We know, time taken $t = \frac{D}{v}$




Hence, $6 = \frac{1920 - 6v}{300} \Rightarrow v = 20$ m/s

26. C

Sol. PV = nRT

(1 atm = 101 $KP_a$ $\therefore$ 50.05 $KP_a$ = 0.5 atm)

$$M = \frac{wRT}{PV} = \frac{0.5760 \times 0.0821 \times 290}{0.5 \times 0.255} \Rightarrow M \approx 107.5$$

i.e. $SF_4$

27. B

Sol. Take any value of a, b, c such that

$a + b + c = 0$ and $a \neq b \neq c$

Say $a = 1, b = -1$ and $c = 0$

Substituting these values in

$$\frac{a^2}{2a^2+bc}+\frac{b^2}{2b^2+ac}+\frac{c^2}{ac^2+ab}=\frac{1}{2}+\frac{1}{2}+0=1$$

28. **D**

Sol. $T^2 \propto R^3$

$$\left(\frac{T_A}{T_B}\right)^2=\left(\frac{R_A}{R_B}\right)^3$$

29. C

Sol. In reactivity series Au is placed below H.

30. B

Sol. When cow is injected with Follicle stimulating hormone which leads to follicle maturation and super ovulation and produce eggs 6 to 8 on an approx. Then artificially inseminate the cow and remove the embryo at 8 to 32 cell stage. Finally transferred the embryos to surrogate mother.

31. A

Sol. $[(30^4)]^{680}$ hence, the rightmost non-zero digit is 1.

32. B

Sol. The conjugate acid of $HPO_4^{2-}$ is $H_2PO_4^-$.

33. **B**

Sol. For mirror

$$v = \frac{uf}{u-f} \Rightarrow v = \frac{-f^2}{-2f} = \frac{f}{2} \qquad (\because \text{ given } u = f)$$

$$\text{Now, } m = \frac{-v}{u} = \frac{h_i}{h_o} \Rightarrow \frac{-f/2}{-f} = \frac{0.75}{h_o}$$

$$\Rightarrow \quad \frac{1}{2} = \frac{0.75}{h_o} \Rightarrow h_o = 1.5 \text{ m} = \frac{3}{2}\text{m}.$$

34. B

Sol. Let solubility of $Ag_2CrO_4$ is s mol $L^{-1}$

$$Ag_2CrO_4(s) \rightleftharpoons \underset{2S}{2Ag^+(aq)} + \underset{S}{CrO_4^{2-}(aq)}$$

$K_{sp} = (2s)^2 \times (s) = 4s^3$ ($\because [Ag^{2+}] = 2s = 2 \times 1.5 \times 10^{-4}$)

$s = 0.75 \times 10^{-4}$

$= 4(0.75 \times 10^{-4})^3$

$K_{sp} = 1.688 \times 10^{-12}$ mol$^3$ $L^{-3}$

35. A

Sol.
$$\frac{55^3+45^3}{55^2-55\times45+45^2}$$

$$=\frac{(55+45)(55^2-55\times45+45^2)}{(55^2-55\times45+45^2)}=(55+45)=100$$

36. **D**

Sol. Due to variable of focal length. The eye cannot adjust beyond this limit.

37. B

Sol. Germplasm are living genetic resources such as seeds or tissue that are maintained for the purpose of animal and plant breeding.

38. D

Sol. Virus require host's machinery for replication of their genetic material, synthesis of new protein and multiplication. Red blood cells do not have nucleus and nuclear material therefore, virus cannot target them as host.

39. B

Sol. Total marks of 10 papers = 80 × 10 = 800
Total marks of 8 papers = 81 × 8 = 648
Total marks of two papers = (800 – 648) = 152
If highest total is 92, then the lowest total is (152 – 92) = 60.

40. C

Sol. $H_2SO_4 \rightarrow 2H^+ + SO_4^{2-}$

$H_2O \rightarrow H^+ + OH^-$

At anode (positive electrode)

$2OH^- \rightarrow H_2O + \frac{1}{2}O_2 + 2e^-$

41. **A**

Sol. $R = \frac{V^2}{P} \Rightarrow R \propto \frac{1}{P} \Rightarrow R_{60} > R_{100}$

Also, $R \propto \frac{1}{A}$ $A_{100} > A_{60}$

100 W bulb has thicker filament.

42. **D**

Sol. When connected along ABCD area = 60 cm$^2$ = 60 × 10$^{-4}$ m$^2$ length = 8 cm = 8 × 10$^{-2}$ m

$R_1 = \rho\frac{8}{60} \times \frac{10^{-2}}{10^{-4}}\Omega$

Along AEHD $R_2 = \rho\frac{10}{48} \times \frac{10^{-2}}{10^{-4}}\Omega$

Along AEFB $R_3 = \rho\frac{6}{80} \times \frac{10^{-2}}{10^{-4}}\Omega$

As $R_2 > R_1 > R_3$

$\therefore$ $I_2 < I_1 < I_3$

43. **D**

Sol. Magnetic field at the centre is zero.

44. B

Sol. $N_2H_4 \rightarrow N_2$ (n-factor = 4)
$M_{eq}$ of $N_2H_4$ required = 100 × 2 = 200
Eq of $N_2H_4$ required = 0.2

Mass of $N_2H_4$ required = eq × eq mass = $= 0.2 \times \frac{32}{4} = 1.6\,g$

45. C

Sol. An emulsifier is an agent which stabilized emulsion.

46. A

Sol. n = 3, $\ell$ = 2(0, 1, 2)

3s 3p 3d

47. A

Sol. Sum of odd integers in the set $\frac{n}{2}\{2\times 3+(n-1)\times 2\}=\frac{n}{2}(2n+4)=n\times(n+2)$

Therefore, the average of the odd integers in the set S = n + 2

Sum of even integers in the set S

$$=\frac{n}{2}\{2\times 2+(n+1)\times 2\}=\frac{n}{2}(2n+2)=n(n+1)$$

Therefore, the average of the even integers in the set S = n + 1, Therefore X – Y = (n + 2) – (n + 1) = 1.

48. D

Sol. Let $y=n^3-7n^2+11n-5$

at n = 1, y = 0

$\therefore$ $n^3-7n^2+11n-5=(n-1)(n^2-6n+5)$

$$=(n-1)^2(n-5)$$

Now, for every value of n, $(n-1)^2$ is always positive (n – 5) is negative for all values < 5. Hence, for n = 6, $(n-1)^2$ (n – 5) is positive. Therefore, the smallest value of m is 6.

49. C

Sol. $2\pi r = 3a = 4x$

Where a = side of equilateral triangle and x = side of square.

Then, $c:s:t=\frac{4}{\pi}:\frac{4\sqrt{3}}{9}:1$

Thus, c > s > t.

50. C

Sol. According to chargaff's rule, A = T so if T = 110 then A is equals to 110. and when C = G so if G = 110 then C is 110. Then the total number of nucleotide in the DNA fragment will be 440.

51. A

Sol. A plasmolyzed cell, where the plasma membrane has pulled away from the cell wall, has a negative pressure potential. If some solute is dissolved in pure water, the solution has fewer free water and the concentration of water decreases, reducing its water potential. Hence, all solutions have a lower water potential than pure water. So $\psi_s$ is always negative.

52. C

Sol. According to chemiosmotic theory, like in respiration, in photosynthesis too, ATP synthesis is linked to development of a proton gradient across a membrane.

53. C

Sol. If rough endoplasmic reticulum was absent in a cell then the synthesis of secretory proteins does not takes place.

54. D

Sol. For this question, we use options.

If we suppose x = 10, then

$AD^2 + CD^2$ should be equal to $AC^2$

$AD^2 + CD^2 = (13)^2 + (7)^2 = 218$

$$CO=\sqrt{y^2-(x-3)^2}=\sqrt{(10)^2-(7)^2}=\sqrt{51}=7\cdot 14$$

$\therefore$ $(AC)^2=(10+7\cdot 14)^2=(17\cdot 14)^2=293\cdot 7.$

Hence, option (A) is not correct.

Likewise, we can try for the options (B) and (C). Since, none the values of x i.e., 10, 11, 12 satisfy the above figure. Hence, none of the options follows.

55. C
Sol. Rate of evaporation decrease with increase in humidity.

56. **D**
Sol. F = q $\nu$B. If charge is positive tension will increase & vice versa.

57. C
Sol. $CaF_2$ is crystalline solid, so it shows anisotropy.

58. C
Sol. Fourth term = 8 $\Rightarrow$ a + 3d = 8
Sum of seven terms,

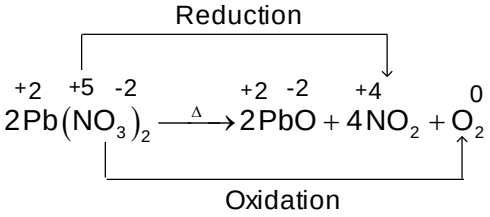
$$S_7 = \frac{7}{2}\left[2a + (7-1)d\right] = \frac{7}{2} \times 2(a + 3d) = 7 \times 8 = 56$$

59. D
Sol. The glomerular filtration rate is 125 ml per minute and for a day 180 Litre.

60. D
Sol. Tube feet is a characteristic feature of the phylum Echinodermata.

61. **B**
Sol. $\frac{\sin i}{\sin r} = \sqrt{3},\ i + r = 90^o$

62. D
Sol.




63. A
Sol. Subtract the two equations

$$x^2 - 3x + 2 = 0$$

(x – 1) (x – 2) = 0
the root 1 and 2 do not satisfy any of the original equation in case these was a common root, it will be the root of the subtracted equation.
So no root.

64. B
Sol. The bone of a mammal contains Haversian canals which are interconnected by transverse canals known as Volkmann's canal.

65. D
Sol. The genetically modified crop of golden rice provide adequate quantities of provitamin A. This transgenic crop help in solving the problem of night blindness in developing countries.

66. D
Sol. $x = \frac{n^2 + 2\sqrt{n}(n+4) + 16}{n + 4\sqrt{n} + 4}$

Let $\sqrt{n} = t$

$\Rightarrow \quad x = \frac{t^4 + 2t(t^2+4) + 16}{t^2 + 4t + 4} = \frac{(t+2)(t^3+8)}{(t+2)^2}$

$$= \frac{t^3+8}{t+2} = t^2 - 2t + 4$$

For t = 6 to $t = 6\sqrt{2}$ (putting in above equation)

$$(40-12) < x < \left(72+4-12\sqrt{2}\right)$$

$\Rightarrow$ $28 < x < 76 - 12\sqrt{2}$

or $28 < x < 60$

67. C

Sol. Highly reactive metals like Al & Mg are obtained by electrolysis.

68. **B**

Sol. $W = 4 \times 10 \times \frac{8}{2}$ = 160 J.

69. **B**

Sol. Area = $W = \frac{1}{2}mv^2$

$\Rightarrow \frac{1}{2} \times 0.1V^2 = \frac{1}{2} \times 10 \times (4+12)$

V = 40 m/s

70. B

Sol. $\Delta n = 0$

71. D

Sol. Artificial passive immunity is the resistance passively transferred to a recipient by administration of antibodies. Ex $\rightarrow$ Anti-tetanus serum, antidiphtheric serum.

72. D

Sol. The motile zygote of the malarial organism that penetrates the mosquito stomach to form an oocyst under the outer gut lining. Then motile spore like stage which enters the host body in the form of sporozoites. Gametocyte is the sexual form male or female, of certain sporozoa, such as malarial plasmodia, found in the erythrocytes (RBCs) which may produce gametes when ingested by secondary host.

73. A

Sol. $x^{2/3} + x^{1/3} - 2 \le 0$

$\Rightarrow$ $x^{2/3} + 2x^{1/3} - x^{1/3} - 2 \le 0$

$\Rightarrow$ $(x^{1/3} - 1)(x^{1/3} + 2) \le 0$

$\Rightarrow$ $-2 \le x^{1/3} \le 1$

$\Rightarrow$ $-8 \le x \le 1$

74. A

Sol. Process of removal of impurities is known as beneficiation of ores.

75. **A**

Sol. $\frac{P.E.}{K.E.} = \frac{mgh}{\frac{1}{2}m(u^2 - 2gh)} = \frac{1}{4}$

$\frac{P.E.}{K.E.} = \frac{mgy}{\frac{1}{2}m(u^2 - 2gy)} = \frac{4}{1}$

y = 4 h.

76. A

Sol. Adipose tissue $\rightarrow$ Subcutaneous tissue around eye

Hyaline cartilage $\rightarrow$ Sternal parts of ribs

Smooth muscle tissue $\rightarrow$ Blood vessels
Simple cuboidal epithelium $\rightarrow$ Nephrons of kidneys

77. **B**

Sol. $\rho_{body} = \frac{4}{5}$

$d_\ell = \frac{4}{5} \times 1000$ = 800 kg/m$^3$

78. C

Sol. $\frac{\left(16n^2 + 7n + 6\right)}{n} \Rightarrow 16n + 7 + \left(\frac{6}{n}\right)$.

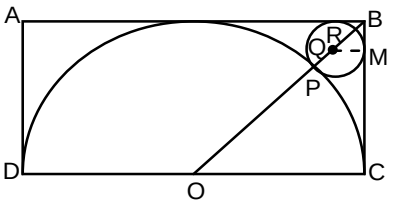
Since, n is an integer, hence for the entire expression to become an integer $\left(\frac{6}{n}\right)$ should be an integer. And $\left(\frac{6}{n}\right)$ can be integer for n = 1, 2, 3, 6. Hence, n will have four values.

79. B

Sol. The primary lymphoid organs are bone marrow and thymus. The B-lymphocytes mature in the bone marrow and migrates to the secondary lymphoid organs via blood and lymph. Here they undergo proliferation and differentiation. T-lymphocytes help B-lymphocytes to produce antibodies which regulate humoral immunity.

80. D

Sol. OC = OP = BC = R (say) radius of semicircle then $OB = R\sqrt{2}$




Similarly, PQ = BM = QM = r (radius of circle)

$\therefore \quad BQ = r\sqrt{2}$ and $BP = r + r\sqrt{2} = r\left(\sqrt{2}+1\right)$

$BP = OB - OP = R\sqrt{2} - R = R\left(\sqrt{2}-1\right)$

$\therefore \quad r\left(\sqrt{2}+1\right) = R\left(\sqrt{2}-1\right) \Rightarrow r = R\left(\sqrt{2}-1\right)^2$

$r = R\left(3 - 2\sqrt{2}\right)$

$$\frac{\text{Area of circle}}{\text{Area of semicircle}} = \frac{\pi r^2}{\pi \frac{1}{2} R^2}$$

$$= \frac{2R^2\left(3-2\sqrt{2}\right)^2}{R^2} = \frac{2\left(17-12\sqrt{2}\right)}{1}$$