

ALL INDIA OPEN TEST SERIES

for

TARGET NTSE-2017-18

PART TEST – 4

(3rd October 2017)

MAT, ENGLISH & SAT
(OBJECTIVE)

*Please handover this booklet only after the
examination is over.*

**ANSWERS
&
SOLUTIONS**

FIITJEE**TARGET NTSE-2017-18****ANSWERS, HINTS & SOLUTIONS****PART TEST – 4****MAT****(Paper – 1)****CODE : 1010****921 FIITJEE students qualified in (2016-17) for NTSE Stage II****ALL INDIA OPEN TEST SERIES**

Q. No.	ANSWERS	Q. No.	ANSWERS
1.	D	30.	D
2.	A	31.	A
3.	A	32.	C
4.	D	33.	D
5.	C	34.	A
6.	B	35.	B
7.	A	36.	C
8.	C	37.	C
9.	D	38.	B
10.	B	39.	D
11.	D	40.	A
12.	B	41.	A
13.	B	42.	A
14.	C	43.	D
15.	B	44.	D
16.	A	45.	D
17.	D	46.	C
18.	C	47.	D
19.	A	48.	B
20.	A	49.	B
21.	D	50.	A
22.	C		
23.	C		
24.	A		
25.	C		
26.	C		
27.	B		
28.	A		
29.	A		

HINTS & SOLUTIONS

1. D

$$\text{Required ratio} = \frac{5040}{3360} = 1.5.$$

2. A

Foreign exchange reserves in 1997-98 = 5040 million US \$

Foreign exchange reserves in 1993-94 = 2520 million US \$

\therefore Increase = (5040 – 2520) = 2520 million US \$

$$\therefore \text{Percentage increase} = \left(\frac{2520}{2520} \times 100 \right) \% = 100\%.$$

3. A

There is an increase in foreign exchange reserves during the years 1992-93, 1994-95, 1996-97 and 1997-98 as compared to previous year (as shown by bar-graph)

The percentage increase in reserves during these years compared to previous year are

$$(i) \text{ For } 1992-93 = \left[\frac{(3720 - 2640)}{2640} \times 100 \right] \% = 40.91\%$$

$$(ii) \text{ For } 1994-95 = \left[\frac{(3360 - 2520)}{2520} \times 100 \right] \% = 33.33\%$$

$$(iii) \text{ For } 1996-97 = \left[\frac{(4320 - 3120)}{3120} \times 100 \right] \% = 38.46\%$$

$$(iv) \text{ For } 1997-98 = \left[\frac{(5040 - 4320)}{4320} \times 100 \right] \% = 16.67\%$$

Clearly, the percentage increase over previous year is highest for 1992-93.

4. D

Average foreign exchange reserves over the given period

$$= \left[\frac{1}{8} \times (2640 + 3720 + 2520 + 3360 + 3120 + 4320 + 5040 + 3120) \right] \text{ million US \$}$$

= 3480 million US \$.

Foreign exchange reserves in 1996-97 = 4320 million US \$.

$$\therefore \text{Required Percentage} = \left(\frac{4320}{3480} \times 100 \right) \% = 124.14\% = 125\%.$$

5. C

Average foreign exchange reserves over the given period = 3480 million US \$.

The country had reserves above 3480 million US \$ during the years 1992-93, 1996-97 and 1997-98 i.e., for 3 years and below 3480 million US \$ during the years 1991-92, 1993-94, 1995-96 and 1998-99 i.e., for 5 years.

Hence, required ratio = 3 : 5.

6. B

$$\frac{A_1}{A_2} = \frac{a^2}{2a^2} = \frac{1}{2}$$

$$A_1 : A_2 = 1 : 2$$

7. A

$$\begin{aligned} 2\pi r &= 2(l + b) \\ &= 2(18 + 26) \end{aligned}$$

$$2\pi r = 88$$

$$r = \frac{88 \times 7}{2 \times 22} = 14 \text{ cm}$$

$$\text{Area} = \pi r^2 = \frac{22}{7} \times 14 \times 14 = 616 \text{ cm}^2$$

8.

C

Let r_2 be the inner radius

$$2\pi r_2 = 440$$

$$r_2 = \frac{440 \times 7}{2 \times 22} = 70 \text{ m.}$$

$$r_1 = 70 + 14 = 84 \text{ m}$$

9.

D

$$\text{Area} = \pi r^2 \times \frac{\theta}{360^\circ}$$

$$\frac{66}{7} = \frac{22}{7} \times r^2 \times \frac{120^\circ}{360^\circ}$$

$$r^2 = 9$$

$$r = 3$$

10.

B

$$b = \frac{l}{2} \quad \dots(i)$$

$$(l - 5)(b + 5) = lb + 100$$

$$l - b = 25 \quad \dots(ii)$$

from (i) and (ii)

$$l - \frac{l}{2} = 25$$

$$\frac{l}{2} = 25$$

$$l = 50, b = 25$$

$$\text{perimeter} = 2(50 + 25) = 150 \text{ m}$$

11.

D

Perimeter (Distance covered by man)

$$2(l + b) = \frac{12 \times 1000 \times 8}{60} = 1600 \text{ m}$$

$$2(3x + 2x) = 1600$$

$$10x = 1600$$

$$x = 160 \text{ m}$$

$$l = 3x = 480 \text{ m. } b = 320$$

$$\text{Area} = l \times b = 480 \times 320 = 153600 \text{ m}^2$$

12.

B

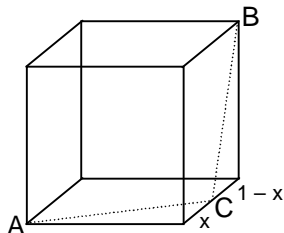
By observation

13.

B

By Observation

14. C
 Total distance covered from A to B along AC and then CB will be $AC + CB = \sqrt{1+x^2} + \sqrt{1+(1-x)^2}$ which will be minimum when $x = 1-x$
 $\Rightarrow x = \frac{1}{2}$



So, minimum distance = $\sqrt{1+\left(\frac{1}{2}\right)^2} + \sqrt{1+\left(1-\frac{1}{2}\right)^2} = \frac{\sqrt{5}}{2} + \frac{\sqrt{5}}{2} = \sqrt{5}$

15. B
 According to question,
 $\frac{6}{8+x} + \frac{6}{8-x} = 2$
 (x is speed of stream)
 $\frac{6(8-x) + 6(8+x)}{8^2 - x^2} = 2$
 $\frac{48 - 6x + 48 + 6x}{64 - x^2} = 2$
 $96 = 128 - 2x^2$
 $32 = 2x^2$
 $x^2 = 16$
 $x = 4$ km/hr

16. A
 Let speed of the boat be x km/hr and that of current is y km/hr.
 $\frac{30}{x+y} = 2 \Rightarrow x+y = 15$... (i)
 $\frac{30}{x-y} = 6 \Rightarrow x-y = 5$... (ii)
 From (i) and (ii)
 $2x = 20$
 $x = 10$ km/hr

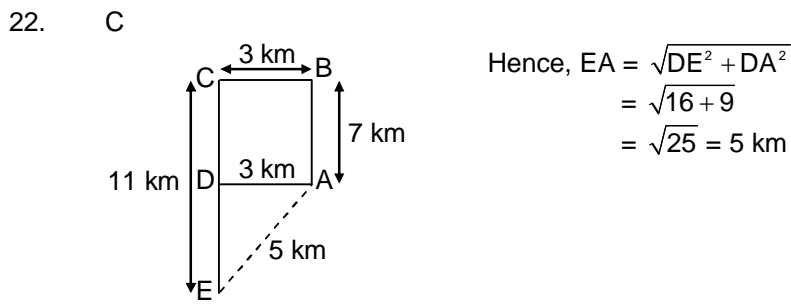
17. D
 Let speed of boat = x km/hr
 Speed of stream = y km/hr
 Upstream speed = (x - y) km/hr
 Downstream speed = (x + y) km/hr
 Since $\frac{D}{x-y} = \frac{2D}{x+y}$
 $\frac{x+y}{x-y} = \frac{2}{1}$
 $x : y = 3 : 1$

18. C
 Train A : length = 100m, speed = 270 km/h = 75 ms⁻¹
 Train B : length = 200 m, speed = 216 km/h = 60 ms⁻¹
 Train B starts and runs for 10 seconds.
 The tail of train B has moved $(60 \times 10) - 200 = 400$ m
 Time taken by train A to catch up train B's tail
 \Rightarrow Train A will catch train B's tail 27 seconds after its start.
 $= \frac{400}{75 - 60} = \frac{400}{15} = 26.67\text{s}$

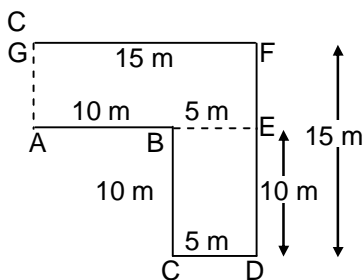
19. A
 Speed of stream = 2 km/hr
 Let speed of boat = x km/hr
 According to condition $\frac{9}{x-2} + \frac{9}{x+2} = 6$
 On solving, we get
 x = 4 km/hr

20. A
 Let the speed of two trains be x m/s and y m/s
Case I: In opposite direction:
 Relative speed will be = (x + y) m/s
 That is, $\frac{230 + 190}{x + y} = 21$ seconds
 $\frac{420}{x + y} = 21$
 x + y = 20 ... (i)
Case II: In same direction:
 Relative speed = (x - y) m/s
 That is, $\frac{420}{x - y} = 21$
 Hence, x - y = 20 ... (ii)
 On solving (i) and (ii), we get
 x = 15 m/s, y = 5 m/s
 Hence, the ratio = 3 : 1

21. D
 $\sqrt{8 + 2\sqrt{15}} + \sqrt{12 - 2\sqrt{35}} + \sqrt{16 - 6\sqrt{7}} + \sqrt{7 - 4\sqrt{3}}$
 $= (\sqrt{5} + \sqrt{3}) + (\sqrt{7} - \sqrt{5}) + (3 - \sqrt{7}) + (2 - \sqrt{3}) = 5$



23.



A is the starting point. G is the destination point.
 $DF = 15 \text{ m}$
 $DE = CB = 10 \text{ m}$
 $EF = 15 - 10 = 5 \text{ m}$
 $AG = EF = \boxed{5 \text{ m}}$

24.

A
 Let distance covered downhill = $x \text{ km}$
 Let distance covered uphill = $y \text{ km}$
 Let distance covered on the plane = $z \text{ km}$

$$\frac{x}{10} + \frac{y}{6} + \frac{z}{7.5} = 3$$

$$\frac{x}{6} + \frac{y}{10} + \frac{z}{15} = 1$$

$$\Rightarrow 3x + 5y + 4z = 90 \quad \dots(i)$$

$$\Rightarrow 5x + 3y + 4z = 30 \quad \dots(ii)$$

Adding (i) and (ii)

$$\Rightarrow 8x + 8y + 8z = 120$$

$$\Rightarrow x + y + z = 15 \text{ km}$$

25.

C

Formula = $\frac{x \times y}{x - y} \times \text{difference between time}$

$$= \frac{4 \times 5}{5 - 4} \times \frac{15}{60} = 5 \text{ km}$$

26.

C

Since Vikram's shadow fell towards right, therefore Vikram is facing South.

So, Betal standing with his back towards Vikram, will be facing North

27.

B

10 years ago average age of 25 teachers = 45 years.

4 years ago (just before the retirement of principal) average age of 25 teachers = $45 + 6 = 51$

years and the same time total age of 25 teachers = $51 \times 25 = 1275$ years

and total age of remaining 24 teachers when just the principal has retired

$$= 1275 - 60 = 1215 \text{ years}$$

1 year later (i.e., 3 years ago from present) total age of 24 teachers (just before the recruitment of new principal)

$$= 1215 + (1 \times 24) = 1239 \text{ years}$$

and the total age of 25 teachers including new principal just after the recruitment

$$= 1239 + 54 = 1293 \text{ years}$$

Thus the present age of all the 25 teachers

$$= 1293 + (3 \times 25) = 1368 \text{ years}$$

Hence, the present average age of the 25 teachers

$$= \frac{1368}{25} = 54 \frac{18}{25} \text{ years.}$$

28.

A

Since all the three distances are same, hence the average speed

$$= \frac{3 \times 10 \times 20 \times 60}{(200 + 1200 + 600)} \quad \left(= \frac{3uvw}{uv + vw + wu} \right)$$

$$= \frac{36000}{2000} = 18 \text{ km/hr.}$$

29.

A

$$\left(1 + \frac{1}{3}\right) \left(1 + \frac{1}{4}\right) \left(1 + \frac{1}{5}\right) \dots \left(1 + \frac{1}{n}\right)$$

$$= \frac{4}{3} \times \frac{5}{4} \times \frac{6}{5} \times \dots \times \frac{n}{(n-1)} \times \left(\frac{n+1}{n}\right) = \frac{n+1}{3}$$

Hence, (A) is the correct option.

30.

D

Given that $ab + bc + ca = 0$

Now $a^2 - bc = a^2 + ab + ca$ [$\because -bc = ab + ca$]

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

Similarly $b^2 - ca = b(a + b + c)$

and $c^2 - ab = c(a + b + c)$

$\therefore \frac{1}{a^2 - bc} + \frac{1}{b^2 - ca} + \frac{1}{c^2 - ab}$

$$= \frac{1}{a(a+b+c)} + \frac{1}{b(a+b+c)} + \frac{1}{c(a+b+c)}$$

$$= \frac{1}{a+b+c} \left[\frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right]$$

$$= \frac{1}{a+b+c} \left[\frac{bc + ac + ab}{abc} \right] = 0 \quad [\because ab + bc + ca = 0]$$

31.

A

$$9261000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7$$

$$(2 \times 3 \times 5)(2 \times 3 \times 7)(2 \times 5 \times 7)(5 \times 7 \times 3)$$

$$\text{Average} = \frac{30 + 42 + 70 + 105}{4} = \frac{247}{4} = 61.75$$

32.

C

Due to late by 15 min, less distance covered by boy = $15v$

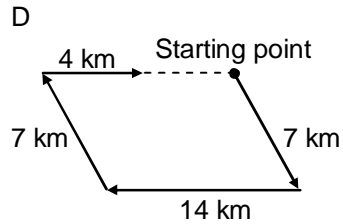
Distance covered in 4 min by $\frac{5}{2}v / \text{min}$

$$\left(\frac{5}{2}v - v\right) \times 4 = 6v$$

Remaining distance $15v - 6v = 9v$

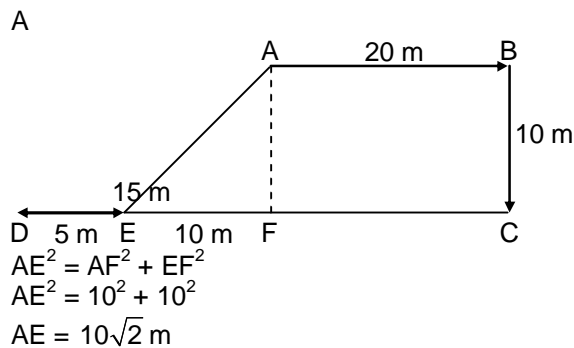
$$\text{Time taken to cover } 9v = \frac{9v}{(4-1)v} = 3 \text{ min}$$

33.



Required distance = $14 - 4 = 10$ km.

34.



35.

B
 50 and 20 seats in the party makes an angle 180° .
 Both 35 seats in the party makes an angle 90° . So option B full fill the given bar chart by the pie-chart.

$$= \frac{(50 + 20)}{140} \times 360 = 180^\circ$$

$$= \frac{35}{140} \times 360 = 90^\circ$$

36.

C
 2nd July 1984 means
 (1983 years 6 months and 2 days)
 1900 years have 1 odd day
 83 years have 20 leap years and 63 ordinary years.
 = (40 + 63) odd days
 = 103
 = 5 odd days
 6 months and 2 days.

Jan	Feb	Mar	Apr	May	June	July
31	29	31	30	31	30	2

 = 184 days = 2 odd days
 Total number of odd days = (1 + 5 + 2)
 = 8 odd days
 = 1 odd day
 Hence, it was Monday on 2nd July, 1984.

37.

C
 We have to find, 1st of all the day on 1st Dec, 1984.
 1st Dec 1984 means (1983 years 11 months and 1 day)
 Now, 1900 years have 1 odd day
 83 years have (20 leap years and 63 ordinary years)
 = (40 + 63) odd days

= 103 odd days
 = 5 odd days
 11 months and 1 day
 Jan Feb Mar Apr May June July Aug Sep Oct Nov Dec
 31 29 31 30 31 30 31 31 30 31 30 31

= 336 days \Rightarrow 0 odd day

Total no. of odd days = (1 + 5 + 0) = 6

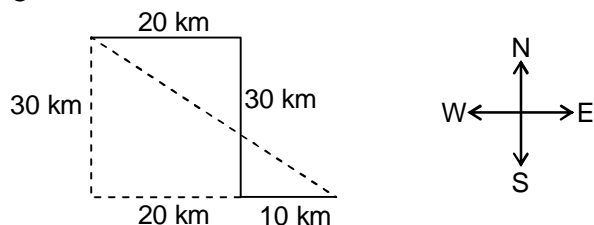
Hence, it was Saturday on 1st Dec 1984 and 1st Sunday was 2nd Dec 1984. Subsequently, Sunday's of the month were on 2nd, 9th, 16th, 23rd and 30th.

38. B
 Bank – Sweetshop – Friend's house – Railway station – Friend's house – Rahul's house.
 2 km + 2 km + 2 km + 2 km + 3 km = 11 km

39. D
 He has covered a distance of 5 km from the Railway station to his house. At a speed of 20 km/hr, it takes 3 minutes for him to cover a distance of 1 km. Total time taken for traveling 5 km is $3 \times 5 = 15$ minutes. Time spent is chatting with his friend's sister is 10 minutes. Total time taken from Railway station to his house is $15 + 10 = 25$ minutes.

40. A
 The direct distance from the bank to his house is 5 km. Since he takes 3 minutes to cover 1 km (speed 20 km/hr), the total time taken is 15 minutes ($5 \times 3 = 15$)

41. C



By Pythagoras theorem

$$\sqrt{(30)^2 + (30)^2} = \sqrt{900 + 900} = \sqrt{2 \times 900} = 30\sqrt{2} \text{ km}$$

42. A
 First we find the day of 1st July 2002.
 $2001 = 2000 + 01$
 No. of odd days in 2000 years = 0
 No. of odd days in 1 non-leap year = 1
 January = 3
 February = 0
 March = 3
 April = 2
 May = 3
 June = 2
 July = 01

Total odd days = 15 i.e. 1 odd day

So, 1st July 2001 \rightarrow Monday

2nd July 2001 \rightarrow Tuesday (1st)

3rd Tuesday \rightarrow 16 July.

43. D
 After 6 years no. of odd days = $1 \times 2 + 5 \times 1 = 7$ odd days i.e. 0 odd days
 (Leap year) (Non-Leap year)

For 6th February 1985

$$1984 = 1600 + 300 + 84$$

No. of odd days in 1600 years = 0

No. of odd days in 300 years = 1

Leap years in 84 years = 21 years

Non leap years in 84 years = 63 years

No. of odd days in 21 leap years = 42 odd days i.e. 0 odd day

No. of odd days in 63 non-leap years = 63 odd days i.e. 0 odd days

$$\text{Jan} = 3$$

$$\text{Feb} = 6$$

Total odd days = $0 + 1 + 3 + 6 = 10$ i.e. 3 odd days.

44.

D

Let 1st January 2007 $\rightarrow x^{\text{th}}$ day
 1st January 2008 $\rightarrow (x + 1)^{\text{th}}$ day
 1st January 2009 $\rightarrow (x + 3)^{\text{th}}$ day
 1st January 2010 $\rightarrow (x + 4)^{\text{th}}$ day
 1st January 2011 $\rightarrow (x + 5)^{\text{th}}$ day
 1st January 2012 $\rightarrow (x + 6)^{\text{th}}$ day
 1st January 2013 $\rightarrow (x + 8)^{\text{th}}$ day
 1st January 2014 $\rightarrow (x + 9)^{\text{th}}$ day
 1st January 2015 $\rightarrow (x + 10)^{\text{th}}$ day
 1st January 2016 $\rightarrow (x + 11)^{\text{th}}$ day
 1st January 2017 $\rightarrow (x + 13)^{\text{th}}$ day
 1st January 2018 $\rightarrow (x + 14)^{\text{th}}$ day

45.

D

1	3	9	9	32	96
1	2	6	\times	23	64
1	1	4	11	23	41
1	\times	3	7	12	18
1	2	3	4	5	6
1	1	1	1	1	1

46.

C

In figure (X), one of the dots lies in the square alone, another dots lies in the region common to the square and the triangle only and the third dot lies in the region common to the circle and the triangle. In figure (A), there is no region which lies in the square alone. In each of the figures (B) and (D), there is no region common to the circle and the triangle only. Only, figure (C) consists of all the three types of regions.

47.

D

$$\text{Speed} = \left(60 \times \frac{5}{18}\right) \text{m/sec} = \left(\frac{50}{3}\right) \text{m/sec}$$

$$\text{Length of the train} = (\text{Speed} \times \text{Time})$$

$$\therefore \text{Length of the train} = \left(\frac{50}{3} \times 9\right) \text{m} = 150 \text{ m.}$$

48.

B

$$\text{Speed of the train relative to man} = \left(\frac{125}{10}\right) \text{m/sec.}$$

$$= \left(\frac{25}{2}\right) \text{m/sec.}$$

$$= \left(\frac{25}{2} \times \frac{18}{5}\right) \text{km/hr}$$

$$= 45 \text{ km/hr}$$

Let the speed of the train be x km/hr. Then, relative speed = $(x - 5)$ km/hr.

$$\therefore x - 5 = 45 \Rightarrow x = 50 \text{ km/hr}$$

49. B

Let the speeds of the two trains be x m/sec and y m/sec respectively.

Then, length of the first train = $27x$ metres and length of the second train = $17y$ metres.

$$\therefore \frac{27x + 17y}{x + y} = 23$$

$$\Rightarrow 4x = 6y$$

$$\Rightarrow \frac{x}{y} = \frac{3}{2}$$

50. A

Let the length of each train be x metres. Then, distance covered = $2x$ metres. Relative speed = $(46 - 36)$ km/hr

$$= \left(10 \times \frac{5}{18}\right) \text{m/sec}$$

$$= \left(\frac{25}{9}\right) \text{m/sec}$$

$$\therefore \frac{2x}{36} = \frac{25}{9}$$

$$\Rightarrow 2x = 100$$

$$\Rightarrow x = 50$$

FIITJEE**TARGET NTSE-2017-18****ANSWERS**

PART TEST – 4
ENGLISH LANGUAGE TEST
(Paper – 2)

CODE : 1011

921 FIITJEE students qualified in (2016-17) for NTSE Stage II

ALL INDIA OPEN TEST SERIES

Q. No.	ANSWERS	Q. No.	ANSWERS
1.	C	30.	A
2.	D	31.	B
3.	A	32.	A
4.	B	33.	B
5.	B	34.	D
6.	C	35.	B
7.	D	36.	D
8.	A	37.	A
9.	C	38.	C
10.	C	39.	C
11.	D	40.	C
12.	A	41.	A
13.	B	42.	B
14.	C	43.	C
15.	D	44.	A
16.	D	45.	C
17.	C	46.	B
18.	D	47.	D
19.	C	48.	B
20.	C	49.	B
21.	B	50.	A
22.	C		
23.	B		
24.	A		
25.	A		
26.	A		
27.	C		
28.	C		
29.	B		

FIITJEE

TARGET NTSE-2017-18

ANSWERS, HINTS & SOLUTIONS

PART TEST – 4

SAT

(Paper – 3)

CODE : 1012

921 FIITJEE students qualified in (2016-17) for NTSE Stage II

ALL INDIA OPEN TEST SERIES

Q. No.	ANSWERS	Q. No.	ANSWERS	Q. No.	ANSWERS	Q. No.	ANSWERS
1.	C	31.	A	61.	B	91.	A
2.	B	32.	C	62.	C	92.	A
3.	A	33.	D	63.	D	93.	A
4.	C	34.	A	64.	B	94.	C
5.	C	35.	C	65.	C	95.	C
6.	C	36.	A	66.	C	96.	B
7.	D	37.	B	67.	C	97.	B
8.	B	38.	B	68.	A	98.	B
9.	B	39.	C	69.	A	99.	B
10.	B	40.	C	70.	B	100.	B
11.	C	41.	C	71.	C		
12.	C	42.	D	72.	C		
13.	B	43.	C	73.	C		
14.	B	44.	B	74.	D		
15.	D	45.	A	75.	B		
16.	D	46.	C	76.	A		
17.	D	47.	A	77.	A		
18.	C	48.	D	78.	A		
19.	D	49.	A	79.	C		
20.	C	50.	B	80.	A		
21.	A	51.	C	81.	D		
22.	C	52.	A	82.	B		
23.	C	53.	B	83.	B		
24.	D	54.	A	84.	A		
25.	C	55.	B	85.	C		
26.	C	56.	B	86.	D		
27.	B	57.	C	87.	C		
28.	A	58.	D	88.	C		
29.	B	59.	C	89.	C		
30.	D	60.	D	90.	B		

HINTS & SOLUTIONS

- Gravitational field inside a spherical shell is zero.
- Satellite will move with a velocity V , tangentially to original orbit.
- Gravitational force does not depend on medium.
- $T^2 = \frac{4\pi^2 r^3}{GM_p}$.
- Areal velocity remains constant.
- $V = \lambda f$
Velocity = Wavelength \times Frequency.
- $$\frac{\left(\frac{2000}{3}\right)}{\lambda_m} = \frac{\left(\frac{3000}{10}\right)}{\lambda_{air}}$$

$$\frac{2}{3\lambda_m} = \frac{3}{10\lambda_{air}}$$

$$\frac{\lambda_m}{\lambda_{air}} = \frac{20}{9}$$
- $\frac{2D}{1.5} = 330$
 $D = 247.5 \text{ m.}$
- Longitudinal.
- $\frac{2}{3}(H\rho g + P_{atm}) = \frac{H}{2}\rho g + P_{atm}$.
- $\frac{V}{2}D_t g = V\rho_B g$
 $D_t = 2\rho_B$.
- Both pieces must have equal volume.
- Equal to the distance of far point from the eye.
- He is nearsighted.
- In group 13, boron is above aluminium. Rest of elements not belong to group 13.
- As atomic size decreases along a period valence electrons becomes more firmly held with nucleus. Thus more amount of energy is required to remove valence electrons which reduces metallic character.
- Tungsten (W) is used in electric bulbs.

18. Newland's law of octave was applicable only upto calcium.
19. Because of the presence of same number of valence electrons the elements of same group have similar chemical properties.
20. The electronic configuration of M is 2, 7. It needs one electron to complete its octet. It has a strong tendency to gain 1 electron and so its ion will be M^- .
21. 2-ethyl-3-methylbut-1-ene
22. $HC \equiv C - H + HCl \longrightarrow CH_2 = CHCl \xrightarrow{+HCl} CH_3CHCl_2$.
23. Because ethyl alcohol and water are polar compounds hence oxygen of alcohol forms hydrogen bond with water molecules.
24. $C_2H_5OH \xrightarrow[\text{Oxidation}]{KMnO_4/H^+} CH_3COOH \xrightarrow[\text{Esterification}]{\begin{matrix} +C_2H_5OH \\ H_2SO_4/\Delta \end{matrix}} CH_3COOC_2H_5$.
25. $\underbrace{NH_2}_{\text{Amino}}\underbrace{CONH_2}_{\text{Amide}}$
26. A is ethanol, it undergoes dehydration when heated with sulphuric acid to form ethene which adds hydrogen in the presence of nickel to form ethane.
27. Higher will be the surface area, higher will be the boiling point.
28. In a dihybrid cross, out of 16 offsprings in F_2 generation, the heterozygous parents will produce 4 of the same genotype, that is 25%. So, in 400 plants, 100 will express the genotype RrTt.
29. Organs having similar structure and origin, but performing different functions are called homologous organs.
30. *E. coli* is found in the large intestine of humans. They pass out with the stools and through sewage reach the rivers. They can contaminate the sources of water supply for human consumption. Presence of a large number of *E. coli* indicates water pollution.
31. Interferons are small protein molecules formed by virus infected cells that induce formation of enzymes to block virus multiplication. Of the above 4 diseases, Measles is a viral disease during which interferons are produced.
32. In incomplete dominance, the F_1 hybrids are a mixture of phenotypes of two parents, this produces a ratio of 1 : 2 : 1 in F_2 generation.
33. The presence of these features (gill slits and tail during embryonic stages of fish, chickens and pigs) suggests that these animals may have had a common ancestor.
34. Antibiotics inhibit the growth and metabolic activity of bacteria by blocking the biochemical pathway essential for bacterial growth and multiplication without harming the host.
35. Parents with B blood group and O blood group do not carry the genes for antigen A in either homozygous or heterozygous condition.
36. Increase in the owl population would pose a great disturbance in the ecosystem since both hawk and owl are dependent on the same food.

37. The fossil remains of the extinct *Archaeopteryx* exhibit both reptilian and avian characters, suggesting evolutionary origin of birds from the reptiles.
38. Test cross is a cross between an individual with a dominant trait and a recessive parent in order to know whether the dominant trait is homozygous or heterozygous.
39. When a female *Anopheles* mosquito bites a healthy person, sporozoites present in the saliva of the mosquito are released into the bloodstream of the person.
40. Bio-magnification is a process by which chemicals like arsenic, cobalt, mercury etc and pesticides like DDT enter the body and get concentrated over time, as they are non-degradable.
41. Let the side be 'a'

$$\frac{\sqrt{3}}{4}a^2 = \frac{1}{2} \times a \times \sqrt{3} + \frac{1}{2} \times 5\sqrt{3}a + \frac{1}{2} \times 2\sqrt{3}a$$

$$\frac{\sqrt{3}}{4}a^2 = \frac{a}{2}(8\sqrt{3})$$

$$\Rightarrow a = 16 \text{ cm}$$

$$\therefore \text{perimeter} = 3 \times 16 = 48 \text{ cm}$$
42. Volume of water drawn off = $\frac{22}{7} \times \frac{35}{2} \times \frac{25}{2} \times h = 11 \times 1000$

$$h = \frac{80}{7} \text{ cm}$$

$$\therefore \text{water level dropped by } \frac{80}{7} \text{ cm}$$
43. odds against means = $\frac{\text{number of unfavorable case}}{\text{number of favorable case}}$
 When a single thrown with two dice total possible out comes = $n(s) = 36$
 For drawing 7; favourable case = $6[(1, 6), (2, 5), (3, 4), (4, 3), (4, 3), (5, 2), (6, 1)]$
 \therefore number of unfavourable case = 30
 \therefore odds against drawing 7 = $\frac{30}{6} = \frac{5}{1}$
44. let the third vertex be (x, y)

$$\left(\frac{-3+0+x}{3}, \frac{1-2+y}{3} \right) = (0, 0)$$

$$\therefore -3+x=0; -1+y=0$$

$$\Rightarrow x=3, y=1$$

$$\therefore \text{third vertex is } (3, 1)$$
45.
$$\frac{2}{3}\pi R^3 = \frac{1}{3}\pi R^2 H$$

$$R = \frac{H}{2}$$

$$H = 2R$$
46. Let points (5, -2); (6, 4) and (7, -2) are representing the vertices A, B and C of given triangle respectively.

$$AB = \sqrt{37}, BC = \sqrt{37}, CA = 2$$
 Also points are not collinear.

47. favourable cards = $26 + 2 = 28$

$$P(E) = \frac{28}{52} = \frac{7}{13}$$

48. let 'r' be the radius

$$4\pi(r + 2)^2 = 4\pi r^2 + 352$$

$$4 \times \frac{22}{7} (r^2 + 4 + 4r) = 4 \times \frac{22}{7} \times r^2 + 352$$

$$r = 6 \text{ cm}$$

49. since diagonals of parallelogram bisect each other

$$\text{Therefore } \left(\frac{1+4}{2}, \frac{1+8}{2} \right) = \left(\frac{4+x}{2}, \frac{4+y}{2} \right)$$

$$4 + x = 5, 4 + y = 9$$

$$x = 1, y = 5$$

50. slope = $\frac{4 - (-2)}{3 - 3} = \frac{6}{0} = \infty$

51. largest rod that can be inserted = $\sqrt{\ell^2 + b^2 + h^2}$

$$= \sqrt{16^2 + 12^2 + \left(\frac{32}{3}\right)^2} = \frac{68}{3} \text{ m}$$

52. favourable cases = 3

Total out comes = 8

$$\therefore P(\text{two heads}) = \frac{3}{8}$$

53. $P(\text{red}) = \frac{11}{20}$

\Rightarrow number of red ball = 22

$$P(\text{blue}) = \frac{1}{5}$$

\Rightarrow number of blue ball = 8

$$\therefore \text{number of black ball} = 40 - (22 + 8) = 10$$

54. Equation of line segment AB = $x - 3y + 14$

Equation of line perpendicular to line segment AB

$$= 3x + y - 13$$

\therefore the perpendicular bisector to AB intersects AB at (0, 13)

55. Sum of lower limit of modal class & upper limit of median class is 315.

56. $P(E) + P(E') = 1$

57. $n = 100$

$$\text{Median} = \ell + \left(\frac{\frac{n}{2} - cf}{f} \right) h$$

$$\begin{aligned} &= 45 + \left(\frac{50 - 48}{23} \right) \times 5 \\ &= 45 + \frac{10}{23} = 45.4 \end{aligned}$$

58. f_0 and f_2 are frequency of class preceding and succeeding modal class.
59. Area = $\frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$
= 4 sq. unit
60. favourable out comes = {HT, TH, HH} = 3
total number of out comes = 4
 $\therefore P(\text{at most one tail}) = \frac{3}{4}$ or $\frac{12}{16}$
61. German unification completed after 3 wars fought over 7 years with Austria, Denmark and France, Kaiser William I became the ruler of a unified Germany.
62. Ireland and Scotland were equal partners in the union called the United Kingdoms is not regarding the history of the nationalist movement in Great Britain.
63. Japan was not interested in Balkan Peninsula.
64. A napalm is an organic compound, used to thicken gasoline, burns slowly and sticks to human body and continues to burn.
65. Nghe An and Ha Tinh were the first to react against the French domination. This is the reason why they are known as the Electric fuses.
66. In 1887 the French Indo-China formed.
67. Poona pact resolved the issue of separate electorates for dalits between Gandhi and Ambedkar in 1932.
68. Jawahar Lal Nehru is head of the Abadh Kisan Sabha.
69. It allowed the detention of prisoners for five years without trial is not true about the Rowlett Act.
70. The most important advantage of Cyrus McComick is 500 acres of wheat could be harvested in two weeks.
71. Slash and burn type agriculture practiced in the Mississippi Valley between 1820 and 1850.
72. Aluminium smelting is regular supply of electricity and an assured source of raw material at minimum cost.
73. In Chennai the first cement plant set up in India.
74. Rourkela steel plant is located on the bank of Brahmani river in Odisha.
75. Assam is the largest producer of silk in India.

76. Bhopal is the first city where first plant for heavy electrical engineering was started.
77. Most of the jute mills are situated in Hugli basin.
78. NH-1 is the historical road between Delhi and Amristar which is made by Shershah Suri.
79. The total length of golden quadrilateral road is 5846 km.
80. The total length of North-South and East-West corridor is 7300 km.
81. Mumbai is a natural harbour in India.
82. Chennai is the oldest port of the eastern coast of India.
83. In 2001 King Birendra was killed by son.
84. An organised aggregate group which seeks to influence the government's decision is called Pressure Group.
85. FEDECOR is the example of Movement Group.
86. In 1964 Communist Party of India-Marxist (CPI-M) formed.
87. In 1980 BJP founded by Shyama Prasad Mukherjee.
88. An alliance is formed when some parties join for the purpose of contesting elections and winning power in hands.
89. Belgium has successfully negotiated among different population.
90. Belgium is a perfect example of accommodation of social diversity.
91. Yugoslavia disintegrated due to ethnic tension between the Serbs and the Albanians.
92. Right to Information Act is the best to empower people to carry out democratic reforms.
93. Foundational Challenge is faced by a non democratic country while changing once to a democratic set up.
94. 24 December is celebrate as National Consumer Day.
95. In October 2005 'Right to Information Act' passed.
96. The First Five Year Plan only inaugurated the process of planning. It's main objective was to increase agricultural and industrial population.
97. The Indian government has been following the policy of liberalisation, globalisation and privatisation since 1991.
98. Indira Gandhi released a special stamp entitled 'Wheat Revolution' in July 1968.
99. The most devastating famine that occurred in India was the famine of Bengal in 1943.
100. 'Seasonal' and 'Chronic' are the two types of hunger.