FIITJEE INTERNAL TEST

MOCK TEST - 3

for

NTSE STAGE – I

(All Class X Batches)

Scholastic Aptitude Test (SAT)

QP CODE:

Time: 120 Minutes ***Maximum Marks: 100***

Please read the instructions carefully.

INSTRUCTIONS

- A: The question paper consists of **100** multiple choice questions divided into five sections.
  Section – I contains **40** questions of **SST.**
  Section – II contains **20** questions of **Mathematics.**
  Section – III contains **13** questions of **Physics.**
  Section – IV contains **13** questions of **Chemistry.**
  Section – V contains **14** questions of **Biology.**
- For each question you will be **awarded 1 mark** if you darken the bubble corresponding to the correct answer and zero mark if no bubbles is darkened or your response is incorrect.
- Attempt **All** questions.
- Use of Calculator is **NOT PERMITTED**.
- All symbols have their usual meanings, if not mentioned in the question.
- The Question Paper contains blank spaces for your rough work.
  No additional sheets will be provided for rough work.
- This booklet also contains **OMR** answer sheet.

Enrollment No. : | | | | | | | | | | | | **Batch :** _____

Name : _____

Candidate's Signature _____ **Invigilator's Signature:** _____

Section – I
Social Science
(1 – 40)

1. What is the Standard Meridian of India?
   (A) 52^o 30' west (B) 82^o 30' south
   (C) 82^o 30' east (D) 82^o 30' north

1. C

Sol. The Standard Meridian of India is 82^o 30' east.

2. According to 'Theory of plate tectonics', the Earth's crust is formed of how many major plates?
   (A) 3 (B) 5
   (C) 7 (D) 8

2. C

Sol. According to 'Theory of plate tectonics', the Earth's crust is formed into 7 type of major plates.

3. Thal, Bhor Pal are the passes that are found in
   (A) Aravalli's (B) Purvanchal
   (C) Eastern Ghats (D) Western Ghats

3. D

Sol. Thal, Bhor and pal are the passes that are found in Western ghats.

4. In which one of the following state is Simlipal bio-reserve in located?
   (A) Punjab (B) West Bengal
   (C) Delhi (D) Odisha

4. D

Sol. Simlipal bio reserve is located in Odisha

5. Which of the following is a component of upper air circulation?
   (A) North easterlies (B) Jet stream
   (C) South west monsoon (D) Kal Baisakhi

5. B

Sol. Jet stream is a component of upper air circulation.

6. Which of the institution advocated about resource conservation for the first time in a more systematic way in 1968 at international level?
   (A) Club of USA (B) Club of Rome
   (C) Club of China (D) Club of Russia

6. B

Sol. Club of Rome is the institution advocated about resource conservation for the first time in a more systematic way in 1968 at international level.

7. Which river is associated with Sardar Sarovar Dam?
   (A) Godavari (B) Tapti
   (C) Krishna (D) Narmada

7. D

Sol. Narmada river is associated with Sardar Sarovar Dam.

8. In which of the Indian state, the slash and burn agriculture is known as Dahiya?
   (A) Andhra Pradesh (B) Odisha
   (C) Madhya Pradesh (D) Rajasthan

8. **C**

Sol. In Madhya Pradesh the slash and burn agriculture is known as Dahiya.

9. When was the first successful textile mill established in India?
(A) Bombay (B) Calcutta
(C) Cuttack (D) Surat

9. **A**

Sol. In Bombay the first successful textile mill established in India.

10. National Waterway No.1 is navigable between which of the following places ?
(A) Sadiya and Dubri (B) Allahabad and Haldia
(C) Kottappuram and kollam (D) Udyog mandal and Champakkara

10. **B**

Sol. National Waterway No.1 is navigable in between Allahabad and Haldia.

11. The highest peak in the Eastern Ghats is
(A) Anaimudi (B) Kanchenjunga
(C) Mahendra Giri (D) Khasi

11. C

Sol. The highest peak in the Eastern Ghats is Mahendragiri.

12. **Statement** (A): In 18th century Europe most of the people dressed according to their regional codes.
Reason (R): Clothing styles were strictly regulated by class, gender or status in the social hierarchy.
(A) both (A) and (R) are correct and (R) explains (A)
(B) both (A) and (R) are correct and (R) does not explain (A)
(C) both are incorrect
(D) only (A) is correct

12. **A**

Sol. Statement I is correct.

13. Who are nomads?
(A) They move from one place to the other to earn their living
(B) They are rich farmers in the valleys
(C) They are poor farmers in the mountains
(D) They are thieves and dacoits

13. **A**

Sol. The tribes who move from one place to the other to earn their living are known as nomads.

14. Which one of the following countries was not a part of the Allies in the Second World War?
(A) Switzerland (B) England
(C) France (D) America

14. **A**

Sol. Switzerland was not a part of the Allies in the Second World War

15. “Once my studies ended, I was left with nothing, I started looking for a post. It was impossible to find one at the law courts in Paris. The choice of a career in the army was not open to me as I was not a noble by birth, nor did I have a patron. The church too could not offer me a refuge”. Who said these lines commenting on the social system of the old Regime of France?
(A) John Locke (B) J J Rousseau
(C) Montesquieu (D) George Danton

15. **D**

Sol. These lines were said by George Danton.

16. Who was the leader of Revolution of November 1917?
(A) Nicholas II (B) Vladimir Lenin
(C) Kerensky (D) Trotsky

16. B

Sol. Lenin was the leader of Revolution of November 1917.

17. Who, among the following were known as 'Colons'?
(A) French citizens living in Vietnam (B) French citizens living in Sias.
(C) Educated people of Vietnam (D) Elites of Vietnam

17. **A**

Sol. French citizens living in Vietnam were known as Colons.

18. Which of the following countries made the Balkan problems all the more complicated?
(A) Russia (B) Germany
(C) South Africa (D) North America

18. **A**

Sol. Russia made the Balkan problems all the more complicated.

19. When was Indulekha published?
(A) 1888 (B) 1889
(C) 1890 (D) 1891

19. **B**

Sol. Indulekha was published in 1889.

20. Which of the following were pre – colonial ports of India?
(A) Surat and Bombay (B) Calcutta and Hooghly
(C) Surat and Hooghly (D) Bombay and Calcutta

20. **C**

Sol. Surat and Hooghly were the pre – colonial ports of India.

21. What according to Henry Ford was the 'best cost cutting decision'?
(A) to cut the wages of the workers
(B) not to give overtime
(C) not to give off day in the week
(D) to inspire the workers to work harder by giving them double of their daily wage

21. **D**

Sol. According to Henry Ford the 'best cost cutting decision' was by giving them double of their daily wage.

22. Civil Disobedience Movement started with which main demand?
(A) Abolition of Mont-Ford Reforms (B) Abolition of Salt Law.
(C) Abolition of Dowry (D) Abolition of untouchability

22. **B**

Sol. Civil Disobedience Movement was started with the main demand of Abo!ition of Salt Law.

23. In which of the following countries Universal Adult Franchise was introduced in the 19th country?
(A) England (B) New Zealand
(C) Germany (D) U.S.A

23. **B**

Sol. New Zealand introduced Universal Adult Franchise in the 19th century.

24. When was Soviet Union itself broke down?
(A) 1990 (B) 1991
(C) 1992 (D) 1989

24. **B**

Sol. In 1991 Soviet Union broke down itself.

25. By which party Poland was ruled in 1980?
(A) Polish United worker's party (B) Polish democratic party
(C) Republican party of Poland (D) Solidarity

25. **A**

Sol. Polish United worker's party ruled over Poland.

26. In which of the situation state government is more powerful than the central government?
(A) Monarchy (B) Coming together federation
(C) Dictatorship (D) Holding together federation

26. **B**

Sol. In coming together federation the state government is more powerful than the central government.

27. A money-bill passed by Lok Sabha can be delayed by Rajya Sabha for a maximum period of:
(A) 30 days (B) 14 days
(C) 3 months (D) 6 months

27. **B**

Sol. A money-bill passed by Lok Sabha can be delayed by Rajya Sabha for a maximum period for 14 days.

28. Which of the subject comes under Union List?
(A) Banking (B) Agriculture
(C) Trade (D) Police

Ans. **A**

Sol. Banking comes under Union List.

29. Which organisation was set up by the Nepalese people to restore democracy in Nepal?
(A) The Dual Alliance (B) The Triple Alliance
(C) The Two party Alliance (D) The Seven party Alliance

29. D

Sol. The Seven party Alliance restored democracy in Nepal.

30. Sharing of power is good because
(A) It leads to m stability.
(B) It breeds communal harmony
(C) It is based on equal division of power
(D) All these

30. **D**

Sol. Sharing of power is good because It leads to the stability, It breeds communal harmony and It is based on equal division of power.

31. Panchayati Raj System has been made more effective under
(A) 70 and 71 Constitution Amendment Acts
(B) 71 and 72 Constitution Amendment Acts
(C) 72 and 73 Constitution Amendment Acts
(D) 73 and 74 Constitution Amendment Acts

31. **D**

Sol. Panchayati Raj System has been made more effective under 73 and 74 Constitution Amendment Acts.

32. The Movement led by Martin Luther King Jr was ___
(A) The Black Power Movement (B) African – American Movement
(C) Civil Rights Movement (D) Non – Cooperation Movement

32. **C**

Sol. Civil Rights Movement was led by Martin Luther King Jr.

33. Which of the fundamental rights is also known as 'the heart and soul of our constitution'?
(A) Right to freedom of religion (B) Right to family
(C) Right against exploitation (D) Right to constitutional remedies

33. **D**

Sol. Right to constitutional remedies is also known as 'the heart and soul of our constitution'.

34. What is included for calculating National Income?
(A) Value of final goods (B) Value of final services
(C) Values of intermediate goods (D) Value of final goods and services

34. **D**

Sol. Value of final goods and services is included for calculating National Income.

35. The quasi judicial machinery set up at highest level for redressal of consumer dispute is----
(A) The District Forum
(B) The State Consumer Commission
(C) National Consumer Disputes Redressal Commission
(D) Consumer International

35. **C**

Sol. NCDRC is the highest level of quasi judicial machinery.

36. Which is the most labour absorbing sector of the economy?
(A) Trade (B) Information Technology
(C) Agriculture (D) Industry

36. **C**

Sol. Agriculture is the most labour absorbing sector of the economy.

37. Credit (loan) refers to
(A) an agreement in which the lender supplies the borrower with money, goods or services in return for the promise of future payment.
(B) a large number of transactions in our day-to-day activities involve credit in some form or the other. Credit therefore plays a vital and positive role in this situation
(C) none of the above
(D) all are correct

37. **D**

Sol. Credit (loan) refers to an agreement in which the lender supplies the borrower with money, goods or services in return for the promise of future payment and a large number of transactions in our day-to-day activities involve credit in some form or the other. Credit therefore plays a vital and positive role in this situation.

38. What is correct about SHGs
(A) SHG has generally 15 - 20 members
(B) members can take small loans
(C) the group charge very minimum interest
(D) all the above

38. **D**

Sol. SHG has generally 15 - 20 members, members can take small loans and the group charge very minimum interest.

39. Biotechnology and information technology comes under
(A) primary sector (B) secondary sector
(C) tertiary sector (D) primary sector and secondary sector

39. **C**

Sol. Biotechnology and information technology comes under tertiary sector.

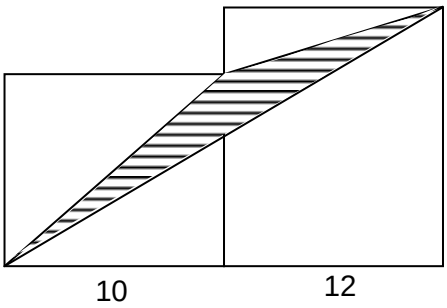
40. When was Sarva Shiksha Abhiyan launched in India?
(A) 2008 (B) 2002
(C) 2007 (D) 2005

40. **B**

Sol. Sarva Shiksha Abhiyan was launched in 2002.

Section – II
Mathematics
(1 – 20)

1. Two squares with side lengths of 10 cm and 12 cm are placed together as shown in figure. Find the shaded area.
(A) 40 cm^2
(B) 50 cm^2
(C) 48 cm^2
(D) 60 cm^2

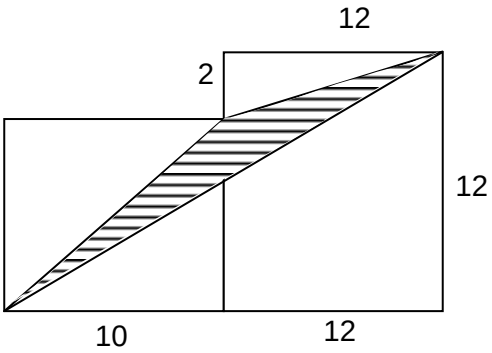


1. B

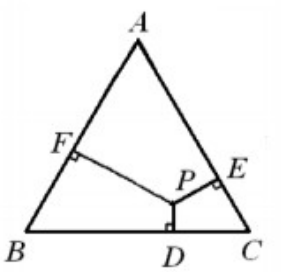
Sol. Shaded Area

$$= 10^2 + 12^2 - \frac{1}{2}\times 22\times 12 - \frac{1}{2}\times 10\times 10 - \frac{1}{2}\times 2\times 12$$

$$= 50\,cm^2$$



2. As shown in figure, P is a point inside the equilateral triangle ABC. The distances from P to each side are PD=1, PE=3 and PF=5 then find area of equilateral triangle ABC.
(A) $27\sqrt{3}\,cm^2$ (B) $24\sqrt{3}\,cm^2$
(C) $30\sqrt{3}\,cm^2$ (D) $32\sqrt{3}\,cm^2$



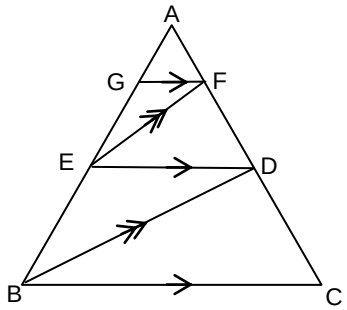
2. A

Sol. Height of equilateral triangle $= 1+3+5 = 9\,cm$

$\Rightarrow$ side of equilateral triangle $= 6\sqrt{3}\,cm$

So, area $= 27\sqrt{3}\,cm^2$

3. In the given figure, AG = GE and GF||ED, EF||BD and ED||BC. Find $\frac{ar(EFG)}{ar(BCDE)}$



(A) $\frac{1}{12}$ (B) $\frac{1}{2}$

(C) $\frac{2}{3}$ (D) $\frac{1}{6}$

3. A

Sol. By converse of mid point theorem, we can see that G, F, E and D are midpoints of AE, AD, AB and AC respectively. Therefore GF, EF, ED and BD are medians in triangles AFE, AED, ADB and ABC.

Now let $ar(AGF) = x$ then $ar(AEF) = 2x = ar(EFD)$, $ar(AED) = 4x = ar(EDB)$ and $ar(ABD) = 8x = ar(BDC)$

$\Rightarrow ar(EFG) : ar(BCDE) = 1:12$

4. In a triangle, if sum of square of medians is 96 then sum of square of sides is

(A) 72 (B) 160

(C) 128 (D) 148

4. C

Sol. 3 (sum of square of sides) = 4 (sum of square of medians)

$\Rightarrow$ sum of square of sides $= \frac{4}{3} \times 96 = 128$

5. ABCD is a parallelogram in which AB = 21 cm, BC = 13 cm and BD = 14 cm. Find AC

(A) 16 cm (B) 32 cm

(C) 24 cm (D) 28 cm

5. B

Sol. Let diagonals AC and BD intersect at O then by Apollonius Theorem,

$AB^2 + BC^2 = 2(AO^2 + BO^2)$

$\Rightarrow AO = 16$ cm $\Rightarrow AC = 32$ cm

6. What is the largest value of x such that x^2 divides $24 \times 35 \times 46 \times 57$?

(A) 36 (B) 144

(C) 12 (D) None of these

6. C

Sol. We factor the product as $2^4.3^2.5.7.19.23$. If x^2 divides this product, then $2^2.3 = 12$ is the largest value of x.

7. The equation $x^3 - 9x^2 + 8x + 2 = 0$ has three real roots p, q, r. Find $\frac{1}{p^2} + \frac{1}{q^2} + \frac{1}{r^2}$.

(A) 25 (B) $\frac{1}{81}$

(C) 16 (D) None of these

7. A

Sol. From Vieta's relations, we have $p + q + r = 9$, $pq + qr + pr = 8$ and $pqr = -2$.

So $\frac{1}{p^2} + \frac{1}{q^2} + \frac{1}{r^2} = \frac{(pq + qr + rp)^2 - 2pqr(p + q + r)}{(pqr)^2} = \frac{8^2 - 2.9.(-2)}{(-2)^2} = 25$

8. A positive real number x is such that $\sqrt[3]{1 - x^3} + \sqrt[3]{1 + x^3} = 1$. Find x^2.

(A) $\frac{1}{3}$ (B) $\frac{\sqrt[3]{26}}{3}$

(C) $\frac{2}{\sqrt[3]{3}}$ (D) $\frac{\sqrt[3]{28}}{3}$

8. D

Sol. Cubing the given equation yields

$1=\left(1-x^3\right)+3\sqrt[3]{\left(1-x^3\right)\left(1+x^3\right)}\left(\sqrt[3]{1-x^3}+\sqrt[3]{1+x^3}\right)+\left(1+x^3\right)=2+3\sqrt[3]{1-x^6}$

Then $\frac{-1}{3}=\sqrt[3]{1-x^6}$, so $\frac{-1}{27}=1-x^6$ and $x^6=\frac{28}{27}$ and $x^2=\frac{\sqrt[3]{28}}{3}$.

9. $a_1,a_2,a_3,.....a_{40}$ are in arithmetic progression. If $a_1+a_5+a_{15}+a_{26}+a_{36}+a_{40}=105$ then sum of the AP is

(A) 700 (B) 1400

(C) 630 (D) 1200

9. A

Sol. Given, $\left(a_1+a_{40}\right)+\left(a_5+a_{36}\right)+\left(a_{15}+a_{26}\right)=105$

$\Rightarrow\left(a_1+a_{40}\right)+\left(a_1+a_{40}\right)+\left(a_1+a_{40}\right)=105$ because sum of terms equidistant from the beginning and the end is equal to the sum of the first and the last terms.

$\Rightarrow 3\left(a_1+a_{40}\right)=105\Rightarrow a_1+a_{40}=35$

$\therefore$ Sum $=\left(\frac{40}{2}\right)\left(a_1+a_{40}\right)=(20)(35)=700$.

10. If $a\sec\alpha-3\tan\alpha=4$ and $b\sec\alpha+4\tan\alpha=3$, then a^2+b^2 is

(A) 21 (B) 19

(C) 17 (D) 25

10. D

Sol. The given equations can be rewritten as $a=4\cos\alpha+3\sin\alpha$ $b=3\cos\alpha-4\sin\alpha$

Squaring and adding the above, we get $a^2+b^2=4^2+3^2=25$

11. If $\operatorname{cosec}\theta-\cot\theta=2$, then the value of $\operatorname{cosec}\theta$ is

(A) $\frac{5}{3}$ (B) $\frac{3}{5}$

(C) $\frac{4}{5}$ (D) $\frac{5}{4}$

11. D

Sol. $\operatorname{cosec}\theta-\cot\theta=2$ (Given)

$\therefore\cot\theta+\operatorname{cosec}\theta=\frac{1}{2}$

Hence, $2\operatorname{cosec}\theta=\frac{5}{2}$ or $\operatorname{cosec}\theta=\frac{5}{4}$

12. If $3a+\frac{1}{2a}=6$, find $4a^2+\frac{1}{9a^2}=?$

(A) 34 (B) 14

(C) $\frac{44}{3}$ (D) $\frac{46}{3}$

12. C

Sol. $\frac{2}{3}\left(3a+\frac{1}{2a}\right)=6\times\frac{2}{3}$

$2a+\frac{1}{3a}=4$

$(2a)^2+\frac{1}{(3a)^2}=16-2\times2\times\frac{1}{3}$

$=16-\frac{4}{3}$

$=\frac{44}{3}$

13. Suppose A, B and C are three numbers for which $1001C-2002A=4004$ and $1001B+3003A=5005$. What is the average of 3 numbers A, B and C?

(A) 1 (B) 3

(C) 6 (D) 9

13. B

Sol. Adding 1001C – 2002A = 4004 and 1001B + 3003A = 5005 yields 1001 A + 1001B + 1001C = 9009. So A + B + C = 9, and the average is $\frac{A+B+C}{3}=3$.

14. One of the sides of a triangle is divided into segments of 6 and 8 units by the point of tangency of the inscribed circle. If the radius of the circle is 4, then the length of the shortest side of the triangle is:

(A) 12 units (B) 13 units

(C) 14 units (D) 15 units

14. B

Sol. Denoting the sides of the triangle by a, b, c we observe that $a=8+6=14$, b = 8 + x, c = x + 6.

$\therefore 2s=a+b+c=2x+28,\ s=x+14$.

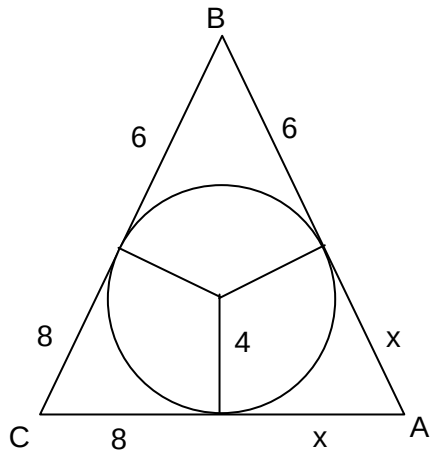
On the one hand, the area of the triangle is half the product of the perimeter and the radius of the inscribed circle; on the other hand, it is given in terms of s so that

Area

$=r.s=4(x+14)=\sqrt{s(s-a)(s-b)(s-c)}=\sqrt{48x(x+14)}$

or $(x+14)^2=3x(x+14)\Rightarrow x+14=3x$.

$\therefore x=7,$ and the shortest side is $c=6+7=13$;



15. The difference of the roots of $x^2-7x-9=0$ is:

(A) 7 (B) $+\frac{7}{2}$

(C) 9 (D) $\sqrt{85}$

15. D

Sol. The roots are $\frac{\left(7\pm\sqrt{49+36}\right)}{2}$ and their difference is $\frac{7+\sqrt{85}}{2}-\frac{7-\sqrt{85}}{2}=\sqrt{85}$

Of the given choices (D) is correct.

16. The volume of a rectangular solid each of whose side, front, and bottom faces are 12 sq. cm, 8 sq. cm, and 6 sq. cm respectively is

(A) 576 cu. cm (B) 24 cu. cm

(C) 36 cu. cm (D) 104 cu. cm

16. B

Sol. $lh = 12,\ hw = 8$ and $lw = 6$

$\Rightarrow (lh \times hw \times lw) = 12 \times 8 \times 6$

$\therefore V = lwh = 24$

17. If 1, 2, 3 are the roots of the equation $x^4 + ax^2 + bx + c = 0$ then the value of c is:

(A) 18 (B) -36

(C) 30 (D) 32

17. B

Sol. The roots are 1, 2, 3 and k

$1 + 2 + 3 + k = 0$

$k = -6$

$c = 1 \times 2 \times 3 \times -6$

$c = -36$

18. If α, β are the roots of the equation $2x^2 - 5x + 16 = 0$, then value of $\left(\frac{\alpha^2}{\beta}\right)^{\frac{1}{3}} + \left(\frac{\beta^2}{\alpha}\right)^{\frac{1}{3}}$ is

(A) $\frac{1}{4}$ (B) $\frac{5}{4}$

(C) $\frac{1}{3}$ (D) $\frac{5}{12}$

18. B

Sol. $2x^2 - 5x + 16 = 0$

$\left(\frac{\alpha^2}{\beta}\right)^{\frac{1}{3}} + \left(\frac{\beta^2}{\alpha}\right)^{\frac{1}{3}}$

$= \frac{\alpha^{2/3}.\alpha^{1/3} + \beta^{2/3}.\beta^{1/3}}{(\alpha\beta)^{1/3}} = \frac{\alpha + \beta}{(\alpha\beta)^{1/3}} = \frac{5/2}{2} = \frac{5}{4}$

19. Find the area (in unit square) of region bounded by $x = 4,\ x + y = 6$ and coordinate axes

(A) 4 (B) 8

(C) 12 (D) 16

19. D

Sol. $x = 0,\ y = 0,\ x = 4,\ x + y = 6$ form a trapezium

Area $= \frac{1}{2} \times 8 \times 4 = 16$ unit^2.

20. In triangle ABC, $\angle A = 80^o$, $\angle B = 50^o$. If AD, BE and CF are altitudes which intersects each other at H then $\angle AHB$ is

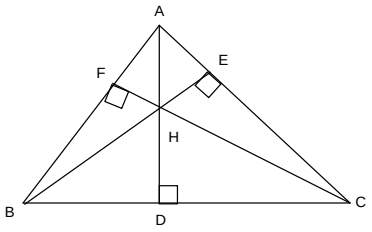
(A) 125^o (B) 110^o

(C) 140^o (D) 130^o

20. D

Sol. $\angle BAD = 40^o$ & $\angle EBA = 10^o$

$\therefore \angle AHB = 130^o$



Section – III

Physics

(1 – 13)

1. A man getting down a running bus falls forward because:
(A) due to inertia of rest, road is left behind and he reaches forward
(B) due to inertia of motion upper part of body continues to be in motion in forward direction while feet come to rest as soon as they touch the road
(C) he leans forward as a matter of habit
(D) of the combined effect of all the three factors stated in A, B and C

1. B

Sol. A man getting down a running bus falls forward because due to inertia of motion upper part of body continues to be in motion in forward direction while feet come to rest as soon as they touch the road.

2. A 300 m long train passes over a bridge at a speed of 180 km/h. If it takes 30sec to cross the bridge, the length of the bridge is
(A) 170 m (B) 1.7 km
(C) 1700 km (D) 1.2 km

2. D

Sol. Let length of bridge = x metre, then

$300 + x = \left(180 \times \frac{5}{18}\right) \times 30$

$= 50 \times 30 = 1500$

$\therefore x = 1500 - 300 = 1200$ m $= 1.2$ km

3. A progressive wave of frequency 250 Hz is travelling with a speed of 350 m/s. A compressional maximum appears at a place at a given instant. The minimum time interval after which a rarefaction maximum occurs at the same point is

(A) $\frac{1}{250}$s (B) $\frac{1}{500}$s

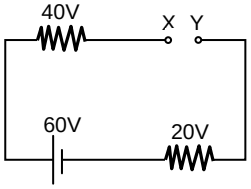
(C) $\frac{1}{1000}$s (D) $\frac{1}{350}$s

3. B

Sol. Time interval between compressional maximum and rarefactional maximum = $\frac{T}{2}$

$\therefore \quad \frac{T}{2} = \frac{1}{2\nu} = \frac{1}{2 \times 250} = \frac{1}{500}$s $\quad \left(\because T = \frac{1}{\nu}\right)$

4. In the circuit shown in the figure, the potential difference between X and Y will be
(A) zero
(B) 20 V
(C) 60 V
(D) 120 V



4. C

Sol. As the circuit is open, no current flows through it.
P.D. between X and Y = emf of the battery = 120 V.

5. Light travels from air into glass of refractive index 1.5. The time taken by the light to travel through a piece of glass with thickness 100 cm is _____ .

(A) 2.25 second
(B) 5×10^{-9} second
(C) 2.25×10^{-8} second
(D) 2.5×10^{-9} second

5. B

Sol. $\mu = \frac{c}{v} \Rightarrow v = \frac{c}{\mu} = \frac{3\times10^8}{1.5} = 2\times10^8$

$\Rightarrow t = \frac{100\times10^{-2}}{2\times10^8} = 5\times10^{-10}$

6. Two solid sphere of radii 2r and 5r, made of the same material are kept in contact. The mutual gravitational force of attraction between them is proportional to

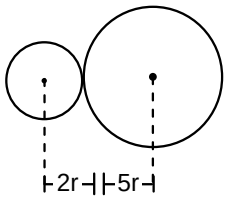
(A) $\frac{1}{r^4}$
(B) $\frac{1}{r^2}$
(C) r^2
(D) r^4

6. D

Sol. $F = \frac{G m_1 m_2}{(7r)^2}$

$= \frac{G\left(\frac{4}{3}\pi(2r)^3\right)\rho\left(\frac{4}{3}\pi(5r)^3\right)\rho}{49r^2}$

$F \propto r^4$



7. A simple pendulum has time period T on the surface of earth. If the pendulum is taken to a height of 19200 km above the surface of earth and made to oscillate its new period will be [take radius of each 6400 km]

(A) $\frac{T}{2}$
(B) 4T
(C) 2 T
(D) 3 T

7. B

Sol. $\frac{T_1}{T_2} = \sqrt{\frac{g_2}{g_1}} = \frac{r_1}{r_2} = \frac{(19200+6400)}{6400} = 4$

$T_1 = 4T$

8. Two cylindrical vessels have different base area. They are filled with water to the same height. If the amount of water in one be sixteen times that in the other, then the ratio of force on their bottom will be

(A) 8 : 1
(B) 4 : 1
(C) 16 : 1
(D) 2 : 1

8. C

Sol. Since height remains same so pressure at bottom remains same for both vessels.

$F_a = PA_a$; $F_b = PA_b$

$\frac{V_A}{V_B} = \frac{16}{1} = \frac{A_a}{A_b}$; $\frac{F_a}{F_b} = \frac{A_a}{A_b} = \frac{16}{1}$ = 16 : 1

9. The magnitude of force which changes the velocity of a body of mass 2 kg from 50 m/s to 30 m/s in five seconds is

(A) 4 N
(B) 5N
(C) 8 N
(D) 25N

9. C

Sol. $F = \left|\frac{m(v-u)}{t}\right| = 2 \times \frac{20}{5} = 8N$

10. A body released from a height h takes time t to reach earth's surface. The time taken by the same body released from the same height to reach the moon's surface is
(A) t (B) 6t
(C) $\sqrt{6}$ t (D) $\frac{t}{6}$

10. C

Sol. time on Earth $= \sqrt{\frac{2h}{g}} = t$, time on Moon $= \sqrt{\frac{2h}{9/6}} \Rightarrow \sqrt{6}\sqrt{2h/g} \Rightarrow \sqrt{6}\,t$

11. On which of the following factors the force of friction do not depend?
(A) Type of the material in contact (B) Normal force
(C) Nature of the surfaces in contact (D) Area of the surfaces in contact

11. D

Sol. fr = μ N

$\mu \rightarrow$ depends on Type of material and nature of surfaces in contact.

12. The termperature at which the resistance of a copper wire would be double its value at 0°C is (temperature coefficient of resistance of Cu = 3.9×10^{-3} °C^{-1})
(A) 128°C (B) 256°C
(C) 512°C (D) 740°C

12. B

Sol. $2 = 1 + 3.9 \times 10^{-3} \Delta T$

$\Rightarrow \quad \Delta T = \frac{1}{3.9 \times 10^{-3}}$

$\Rightarrow \quad \Delta T = 256.4°C$

13 What causes cataract in older people?
(A) Eye lens becomes thicker (B) Eye lens becomes thinner
(C) Eye lens becomes opaque (D) Eye lens becomes stiff

13. C

Sol. Since, eye lens becomes opaque.

Section – IV
Chemistry
(1 – 13)

1. An organic compound is a clear liquid having a molecular formula C_4H_8O. It has an open chain structure. Without any carbon-carbon double bond. The compound can be:
(1) an alcohol (2) an ester (3) an aldehyde (4) a ketone
(A) 1 & 2 (B) 3 & 4
(C) 2 & 4 (D) 4 & 1

1. **B**

2. The number of electrons in 3.1 mg NO_3^- is:
(A) 32 (B) 1.6×10^{-3}
(C) 9.6×10^{20} (D) 9.6×10^{23}

2. **C**

3. According to Bohr's theory, the angular momentum of an electron in 5th orbit is:

(A) $25\,h/\pi$ (B) $\frac{h}{\pi}$

(C) $\frac{10h}{\pi}$ (D) $mvr = \frac{5h}{2\pi}$

3. **D**

4. The pH of 0.1 M solution of the following increases in the order of:

(A) NaCl < NH_4Cl < NaCN < HCl (B) HCl < NH_4Cl < NaCl < NaCN

(C) NaCN < NH_4Cl < NaCl < HCl (D) HCl < NaCl < NaCN < NH_4Cl

4. **B**

5. The isomerism which exists between CH_3CHCl_2 and CH_2ClCH_2Cl is

(A) chain isomerism (B) functional group isomerism

(C) positional isomerism (D) metamerism

5. **C**

6. Consider the following reaction:

$A + 2B \longrightarrow C + D$

If $\frac{W_A}{W_B} = 0.5,$ which condition will make B a limiting reagent and A to be present in excess?

(A) $\frac{M_B}{M_A} < 1$ (B) $\frac{M_B}{M_A} > 1$

(C) $\frac{M_B}{M_A} = 1$ (D) B will always be limiting reagent

6. **B**

7. Correct formula of dolomite is

(A) $CaCO_3 \cdot MgCO_3$ (B) $CaCO_3 \cdot ZnCO_3$

(C) $MgCO_3 \cdot ZnCO_3$ (D) $FeCO_3 \cdot CaCO_3$

7. **A**

8. A gas at a pressure of 5.0 atm is heated from 0°C to 546°C and simultaneously compressed to one-third of its original volume. Hence, final pressure is:

(A) 10 atm (B) 30 atm

(C) 45 atm (D) 5 atm

8. **C**

9. The total energy of an electron in the hydrogen atom in the ground state is −13.6 e.v. The K.E. of this electron is :

(A) 13.6 e.v. (B) −6.8 e.v.

(C) −13.6 e.v. (D) 6.8 e.v.

9. **A**

10. In any subshell, the maximum number of electrons having same value of spin quantum number is (ℓ azimuthal quantum number):

(A) $\sqrt{\ell(\ell+1)}$ (B) $\ell + 2$

(C) $2\ell + 1$ (D) $4\ell + 2$

10. **C**

11. When 400g of a 20% solution by weight was cooled, 50 g of solute precipitated. The percentage concentration of remaining solution is:

(A) 8.57% (B) 15%

(C) 12.25% (D) 9.5%

11. **A**

12. Consider the balanced chemical reaction:
$a\ I_2O_5 + b\ BrF_3 \longrightarrow c\ IF_5 + d\ O_2 + e\ Br_2$
calculate the value of (b + c + e)/a.
(A) 10 (B) 7
(C) 6 (D) 3

12. **B**

13. The order of corrosion of metals, namely aluminium, iron, tin and zinc is
(A) Fe > Sn > Al > Zn (B) Sn > Fe > Al > Zn
(C) Al > Zn > Fe > Sn (D) Fe > Zn > Sn > Al

13. **C**

Section – V
Biology
(1 –14)

1. Match Column – I with Column – II and identify the correct answer.

Column-I			Column-II
(1)	Virus	(Q)	Filariasis
(2)	Bacteria	(R)	Tetanus
(3)	Protozoa	(S)	Sleeping sickness
(4)	Nematoda	(T)	Polio

Match the correct option?
(A) $1 \rightarrow Q$; $2 \rightarrow T$; $3 \rightarrow S$; $4 \rightarrow R$
(B) $1 \rightarrow R$; $2 \rightarrow S$; $3 \rightarrow T$; $4 \rightarrow Q$
(C) $1 \rightarrow T$; $2 \rightarrow R$; $3 \rightarrow S$; $4 \rightarrow Q$
(D) $1 \rightarrow Q$; $2 \rightarrow S$; $3 \rightarrow T$; $4 \rightarrow R$

1. C

Sol. Virus – Polio
Bacteria – Tetanus
Protozoa – Sleeping sickness
Nematoda – Filariasis

2. If the diaphragm is punctured:
(A) inhalation is not possible (B) exhalation is not possible
(C) both a and b (D) breathing can take place

2. C

Sol. If the diaphragm is punctured then inhalation and exhalation is not possible.

3. Choose the tissue which is present in trachea and fallopian tube

(A) squamous epithelium (B) ciliated epithelium

(C) cuboidal epithelium (D none

3. B

Sol. Ciliated epithelium is found in trachea and fallopian tube.

4. Read the following statements and select the correct option:–

(1) It is a colourless, highly acidic liquid

(2) It contains an enzyme called pepsin

(3) It kills any germs which may have entered along with the blood

(4) It converts protein into peptides

(A) Pancreatic juice (B) Bile juice

(C) Gastric juice (D) Saliva

4. C

Sol. Gastric juice is highly acidic, has enzymes call pepsin, kills germs and converts proteins into peptides.

5. **Assertion (A):** – Colour blindness is more common in males than in females.
Reason (R): – Colour blindness defect is due to dominant genes which occur in the 'Y' chromosomes.

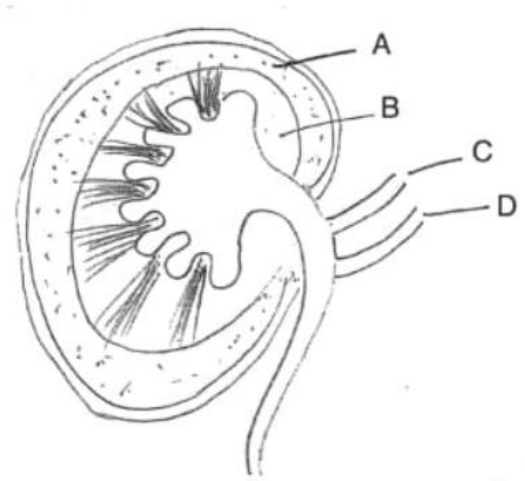
Select the correct option from the given alternatives.
(A) 'A' is true and 'R' is false
(B) 'A' is false and 'R' is true
(C) Both 'A' and 'R' is true and 'R' explains 'A'
(D) Both 'A' and 'R' is true but 'R' does not explains 'A'

5. A

Sol. Colour blindness is more common in males than females.

Colour blindness is due to the defect on X chromosome

6. Study the labeled diagram below and select the correct option.



(A) A → Medulla; B → Cortex; C → Renal artery; D → Renal vein

(B) A → Cortex; B → Medulla; C → Renal vein; D → Renal artery

(C) A → Cortex; B → Medulla; C → Renal artery; D → Renal vein

(D) A → Medulla; B → Cortex; C → Renal vein1; D → Renal artery

6. C

Sol. A → Cortex; B → Medulla; C → Renal artery; D → Renal vein

7. **Read the following statements and select the correct option.**

I. The main causes of water pollution is addition of harmful substances like fertilizers and pesticides to water.

II. Bio magnification and Eutrophication are related to water pollution.

(A) (I) is false (II) is true

(B) (I) is true and (II) is false

(C) both (I) and (II) are true

(D) both (I) and (II) are false

7. C

Sol. Statement I and II are true.

8. "Amphibians" of plant kingdom are:

(A) Thallophyta

(B) Bryophyta

(C) Lichens

(D) Gymnosperms

8. B

Sol. "Bryophyta" are known as amphibians of plant kingdom.

9. Identify the correct statements about photosynthesis:–

I. Mesophyll cells in a leaf are the principal centre of photosynthesis.

II. Splitting of water (H_2O) molecules into hydrogen and oxygen ions in the presence of light is called oxidation.

III. Conversion of glucose into starch is called photolysis.

IV. The electrons are used in converting ADP into energy rich compound ATP by adding one phosphate group Pi.

(A) (I) and (II) only

(B) (I) and (iv) only

(C) (II) and (III) only

(D) (III) and (IV) only

9. B

Sol. Mesophyll cell in a leaf are the principal centre of photolysis. The electrons are used in converting ADP into ATP by adding one phosphate group Pi.

10. If the common salt is sprinkled on lawn grass, it is killed at the spot. This is due to:–

(A) Plasmolysis

(B) Endosmosis

(C) Absorption

(D) Translocation

10. A

Sol. When common salt is sprinkled on the lawn grass, it is killed at the spot due to 'plasmolysis'.

11. **Read the following statements and select the correct option.**

I. The largest artery is aorta, which caries oxygenated blood.

II. Bicuspid valve is present between right auricle and right ventricle

(A) (I) is false (II) is true (B) (I) is true and (II) is false

(C) both (I) and (II) are true (D) both (I) and (II) are false

11. B

Sol. The largest artery is aorta, which carries oxygenated blood. Bicuspid valve is present between left auricle and left ventricle.

12. Cretinism and myxedema are due to

(A) Hyper secretion of growth hormone (B) Hypo secretion of growth hormone

(C) Hyper secretion of thyroxin (D) Hypo secretion of thyroxin

12. D

Sol. Cretinism and Myxedema are caused by hypo secretion of the hormone thyroxine.

13. Rahul's friends are suffering from some diseases. Ritika is suffering from rickets, Satish has haemophilia and Soumya has H_1N_1. Then who can communicate disease to Rahul?

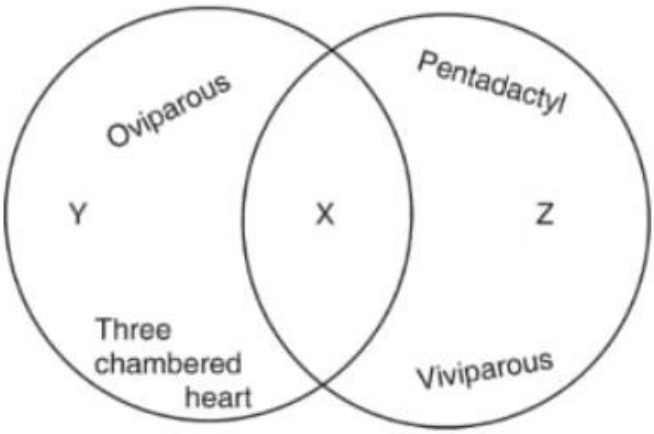
(A) Ritika and Soumya only (B) Satish and Soumya only

(C) Soumya only (D) Ritika only

13. C

Sol. Soumya can communicate H1N1 to Rahul as it is a communicable disease, caused by virus.

14. Refer to given Venn diagram below and select the correct option regarding 'X', 'Y' and 'Z'.



(A) 'Y' can be lizard, 'Z' can be tiger and there is no such organism as 'X'.

(B) 'X' can be bat and 'Z' can be ostrich

(C) 'Y' can be snake and 'Z' can be emu

(D) There is no such organism as 'Z"

14. A

Sol. Y is a lizard, Z is a tiger and there is no organism like X

ANSWER KEYS
MOCK TEST – 3
for
NTSE STAGE – I
(All Class X Batches)

Mental Ability Test

QP CODE:

ANSWERS
Section – I
Social Science

Section – II
Mathematics

Section – III
Physics

Section – IV
Chemistry

Section – V
Biology

Hints & Solutions