

PHYSICS, CHEMISTRY & MATHEMATICS**(For Admission into 1st Semester of 3 Years Diploma Course)**

Candidate's Roll Number

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Application Number

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OMR Serial Number

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Undertaking :

I have carefully gone through the instructions given below and hereby agree to follow them.

 Full Signature of the Candidate

 Full Signature of the Invigilator
INSTRUCTIONS TO CANDIDATE

- After receiving the question booklet, gently pull out the answer sheet without breaking the paper seal of the Question Booklet.
- Check that the SET CODE printed on the top of this question booklet is same as that printed on the OMR sheet. In case it is different, please get it replaced with a question booklet with the same SET CODE as that of the OMR answer sheet from the invigilator.
- Fill in the boxes given in the OMR sheet by using Blue or Black Ball-point pen.
- OPEN THE SEAL OF THE QUESTION BOOKLET ONLY AFTER THE ANNOUNCEMENT BY THE INVIGILATOR TO DO SO.**
- Use HB Pencil/Blue or Black Ball-point Pen to darken the appropriate circles in the OMR sheet. Darken only one circle for a question which you consider to be most correct. If more than one circle(s) are darkened for any question, it will be treated as the incorrect answer. A faintly darkened circle may be interpreted as wrong method of marking and may be rejected by the optical scanner.
- All Questions are compulsory.
- Each correct answer will fetch 04 marks whereas each incorrect answer will lead to deduction of 01 mark. Each unattempted question will fetch zero mark.
- Use blank spaces provided in the question booklet for rough work. Doing the rough work on the answer sheet is forbidden.
- The Answer sheet consists of two pages, the top one is the original answer sheet whereas the annexed one is carbon copy. Do not detach the carbon copy of the answer sheet by yourself. If the carbon copy is detached, the answer sheet will be rejected.
- If you finish answering, remain seated in your seat till the Answer Sheet and other materials are collected by the invigilator from you.
- The carbon copy of the Answer sheet will be detached by the invigilator at the end of the examination and returned to you.
- You are warned not to adopt any unfair means during the examination.
- Do not carry any cellular/mobile phone/electronic gadget into the Examination Hall.

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This Question Booklet contains 56 pages excluding the cover page. There are 100 Questions [Part-I (Chemistry-25) + Part-II (Mathematics-50) + Part-III (Physics-25)] in all. Check every page of this Question Booklet carefully. If you find it defective in any manner, ask for another Question Booklet of the same set within 10 minutes of the commencement of Examination.

PART-I
(CHEMISTRY)

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|--|--|
| <p>1. (a) Carbonates of Ca and Mg cause hardness of water.</p> <p>(b) Lime removes only temporary hardness</p> <p>(c) Washing soda removes only permanent hardness.</p> <p>(A) (a) is correct and (b) and (c) are wrong</p> <p>(B) (b) is correct and (c) and (a) are wrong</p> <p>(C) (c) is correct and (a) and (b) are wrong</p> <p>(D) (a), (b) and (c) are wrong</p> <p>2. The formula of a metallic oxide is M_2O_3. The metal would belong to which group of the modern periodic table ?</p> <p>(A) IA</p> <p>(B) IIA</p> <p>(C) IIIA</p> <p>(D) IVA</p> | <p>1. (a) କାଲସିୟମ୍ ଓ ମାଗ୍ନେସିୟମ୍‌ର କାର୍ବୋନେଟ୍ ଯୋଗୁଁ ଜଳ ଖର ହୋଇଥାଏ</p> <p>(b) ଲୁଗ୍‌ଲାଇମ୍ ଅସ୍ଥାୟୀ ଖରତ୍ୱ ଦୂର କରେ ।</p> <p>(c) ଲୁଗ୍‌ସୋଡା ସୋଡା କେବଳ ସ୍ଥାୟୀ ଖରତ୍ୱ ଦୂର କରେ</p> <p>(A) (a) ଠିକ୍ ଏବଂ (b) ଓ (c) ଭୁଲ୍</p> <p>(B) (b) ଠିକ୍ ଏବଂ (c) ଓ (a) ଭୁଲ୍</p> <p>(C) (c) ଠିକ୍ ଏବଂ (a) ଓ (b) ଭୁଲ୍</p> <p>(D) (a), (b) ଓ (c) ଭୁଲ୍</p> <p>2. ଏକ ଧାତବ ଅକ୍ସାଇଡ୍‌ର ସଂକେତ M_2O_3 ଅଟେ । ଆଧୁନିକ ପର୍ଯ୍ୟାୟ ସାରଣୀରେ ଉକ୍ତ ଧାତୁଟି କେଉଁ ଗ୍ରୁପ୍‌ର ହୋଇଥିବ ?</p> <p>(A) IA</p> <p>(B) IIA</p> <p>(C) IIIA</p> <p>(D) IVA</p> |
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(Space For Rough Work)

5. (a) Air pollution causes acid rain.
 (b) Acid rain causes water pollution.
 (c) Water pollution causes soil pollution.
- (A) (a) and (b) are correct and (c) is wrong
 (B) (b) and (c) are correct and (a) is wrong
 (C) (c) and (a) are correct and (b) is wrong
 (D) (a), (b) and (c) are correct
5. (a) ବାୟୁ ପ୍ରଦୂଷଣ ଯୋଗୁଁ ଅମ୍ଳବର୍ଷା ହୁଏ ।
 (b) ଅମ୍ଳବର୍ଷା ଯୋଗୁଁ ଜଳ ପ୍ରଦୂଷଣ ହୁଏ ।
 (c) ଜଳପ୍ରଦୂଷଣ ଯୋଗୁଁ ମୃତ୍ତିକା ପ୍ରଦୂଷଣ ହୁଏ ।
- (A) (a) ଓ (b) ଠିକ୍ ଏବଂ (c) ଭୁଲ୍
 (B) (b) ଓ (c) ଠିକ୍ ଏବଂ (a) ଭୁଲ୍
 (C) (c) ଓ (a) ଠିକ୍ ଏବଂ (b) ଭୁଲ୍
 (D) (a), (b) ଓ (c) ଠିକ୍
6. The ore of which metal is not suitable for electrolytic reduction ?
- (A) Mg
 (B) Zn
 (C) Al
 (D) Li
6. କେଉଁ ଧାତୁର ଓର୍ ଶ୍ରେଣୀଗତ ବିଜାରଣ ପାଇଁ ଅନୁପଯୁକ୍ତ ?
- (A) Mg
 (B) Zn
 (C) Al
 (D) Li

(Space For Rough Work)

8. How many electrons take part in the formation of a carbondioxide molecule ?

- (A) 2
(B) 4
(C) 6
(D) 8

8. କାର୍ବନ୍‌ଡାଇଅକ୍ସାଇଡ୍ ଅଣୁ ଗଠନରେ କେତୋଟି ଇଲେକ୍ଟ୍ରନ୍ ଭାଗ ନେଇଥାନ୍ତି ?

- (A) 2
(B) 4
(C) 6
(D) 8

9. The mass of 1.12 litres of carbon-dioxide at NTP would be

- (A) 2.05 g
(B) 2.10 g
(C) 2.15 g
(D) 2.20 g

9. ମାନକ ଚାପ ଓ ତାପମାତ୍ରାରେ 1.12 ଲିଟର କାର୍ବନ୍‌ଡାଇଅକ୍ସାଇଡ୍‌ର ବସ୍ତୁତ୍ତ୍ୱ ହେବ

- (A) 2.05 ଗ୍ରା.
(B) 2.10 ଗ୍ରା.
(C) 2.15 ଗ୍ରା.
(D) 2.20 ଗ୍ରା.

(Space For Rough Work)

12. (a) Electrovalent bonds are generally formed between the elements at the two ends of the modern periodic table.

(b) Covalent bonds are generally formed between the non-metals.

(c) Electrovalent compounds have low melting points and covalent compounds have high melting points.

(A) (a) and (b) are correct and (c) is wrong

(B) (b) and (c) are correct and (a) is wrong

(C) (c) and (a) are correct and (b) is wrong

(D) (a), (b) and (c) are correct

12. (a) ସାଧାରଣତଃ ଆଧୁନିକ ପର୍ଯ୍ୟାୟ ସାରଣୀର ଦୁଇ ପ୍ରାନ୍ତରେ ଥିବା ମୌଳିକଗୁଡ଼ିକ ମଧ୍ୟରେ ବିଦ୍ୟୁତ୍ ସଂଯୋଜ୍ୟ ବନ୍ଧ ଗଠିତ ହୋଇଥାଏ ।

(b) ସାଧାରଣତଃ ଅଧାତୁଗୁଡ଼ିକ ମଧ୍ୟରେ ସହସଂଯୋଜ୍ୟ ବନ୍ଧ ଗଠିତ ହୋଇଥାଏ ।

(c) ବିଦ୍ୟୁତ୍‌ସଂଯୋଜ୍ୟ ଯୌଗିକଗୁଡ଼ିକର ଗଳନାଙ୍କ କମ୍ ଥାଏ ଏବଂ ସହସଂଯୋଜ୍ୟ ଯୌଗିକ-ଗୁଡ଼ିକର ଗଳନାଙ୍କ ଅଧିକ ଥାଏ ।

(A) (a) ଓ (b) ଠିକ୍ ଏବଂ (c) ଭୁଲ୍

(B) (b) ଓ (c) ଠିକ୍ ଏବଂ (a) ଭୁଲ୍

(C) (c) ଓ (a) ଠିକ୍ ଏବଂ (b) ଭୁଲ୍

(D) (a), (b) ଓ (c) ଠିକ୍

(Space For Rough Work)

14. Which one belongs to another class ?

- (A) Bitumen/Asphalt
- (B) Pitch/Coaltar
- (C) Coal
- (D) Coke

14. କେଉଁଟି ଅନ୍ୟ ଶ୍ରେଣୀଭୁକ୍ତ ?

- (A) ବିଟୁମେନ୍/ଆସଫାଲ୍ଟ
- (B) ପିଚ୍ଚୁ/ଆଲକ୍ତାରା
- (C) କୋଇଲା
- (D) କୋକ୍

15. Which one is different from the other three ?

- (A) Lime
- (B) Lime stone
- (C) Quick lime
- (D) Slaked lime

15. କେଉଁଟି ଅନ୍ୟ ତିନୋଟି ଠାରୁ ଭିନ୍ନ ?

- (A) ରୁନ
- (B) ରୁନପଥର
- (C) କଲିରୁନ
- (D) ଶମିତ ରୁନ

(Space For Rough Work)

18. The symbol of which one is different from that of the other three according to a certain principle ?

- (A) Chlorine
- (B) Cadmium
- (C) Caesium
- (D) Chromium

19. One milligram of hydrogen will contain how many atoms ?

- (A) 6.023×10^{20}
- (B) 6.023×10^{21}
- (C) 6.023×10^{22}
- (D) 6.023×10^{23}

18. ଏକ ନିର୍ଦ୍ଦିଷ୍ଟ ନିୟମ ଅନୁଯାୟୀ କେଉଁଟିର ପ୍ରତୀକ ଅନ୍ୟ ତିନୋଟିର ପ୍ରତୀକଠାରୁ ଭିନ୍ନ ?

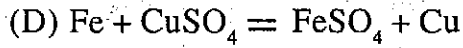
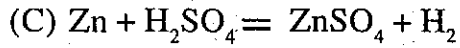
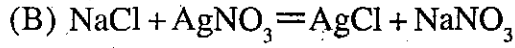
- (A) କ୍ଲୋରିନ୍
- (B) କାଡ଼ମିୟମ୍
- (C) ସିଜିୟମ୍
- (D) କ୍ରୋମିୟମ୍

19. ଏକ ମିଲିଗ୍ରାମ୍ ହାଇଡ୍ରୋଜେନରେ କେତୋଟି ପରମାଣୁ ଥିବ ?

- (A) 6.023×10^{20}
- (B) 6.023×10^{21}
- (C) 6.023×10^{22}
- (D) 6.023×10^{23}

(Space For Rough Work)

22. Which one of the following is a neutralisation chemical reaction ?



23. Out of the following in which case chemical change doesn't occur ?

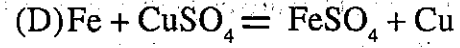
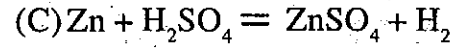
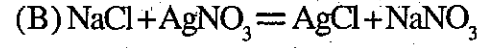
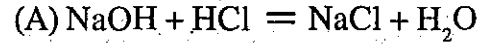
(A) Fire wood oven is glowing

(B) Kerosene stove is glowing

(C) Electric oven is glowing

(D) Gobargas oven is glowing

22. ନିମ୍ନୋକ୍ତ ମଧ୍ୟରୁ କେଉଁଟି ପ୍ରଶମନ ରାସାୟନିକ ପ୍ରତିକ୍ରିୟା ଅଟେ ?



23. ନିମ୍ନୋକ୍ତ ମଧ୍ୟରୁ କେଉଁ କ୍ଷେତ୍ରରେ ରାସାୟନିକ ପରିବର୍ତ୍ତନ ସଂଘଟିତ ହୁଏ ନାହିଁ ?

(A) କାଠ ରୁଲି ଜଳୁଅଛି

(B) କିରୋସିନ ଷ୍ଟୋଭ୍ ଜଳୁଅଛି

(C) ଇଲେକ୍ଟ୍ରିକ୍ ରୁଲି ଜଳୁଅଛି

(D) ଗୋବରଗ୍ୟାସ୍ ରୁଲି ଜଳୁଅଛି

(Space For Rough Work)

PART—II

(MATHEMATICS)

[Take π as $\frac{22}{7}$ if nothing else is said about it.]

[ଅନ୍ୟ କୌଣସି ସୂଚନା ନ ଥିଲେ π ଲାଗି $\frac{22}{7}$ ବ୍ୟବହାର କର ।]

26. If the ratio of a pair of corresponding medians of two similar triangles is $p : q$, then what is the ratio of the areas of those two triangles ?

- (A) $p : q$
 (B) $q : p$
 (C) $p^2 : q^2$
 (D) $q^2 : p^2$

27. In a circle, \overline{PQ} is a diameter and \overline{AB} is a Chord. $\overline{PQ} \perp \overline{AB}$ and \overline{PQ} intersects \overline{AB} at K . If $PQ = 26$ cm and $KQ = 8$ cm, What is the length of \overline{AB} in cm ?

- (A) 10
 (B) 12
 (C) 20
 (D) 24

26. ଦୁଇଟି ସଦୃଶ ତ୍ରିଭୁଜର ଅନୁରୂପ ମଧ୍ୟମା ଦୁଇଟିର ଅନୁପାତ $p : q$ ହେଲେ, ଉକ୍ତ ତ୍ରିଭୁଜଦ୍ୱୟର କ୍ଷେତ୍ରଫଳର ଅନୁପାତ କେତେ ?

- (A) $p : q$
 (B) $q : p$
 (C) $p^2 : q^2$
 (D) $q^2 : p^2$

27. ଗୋଟିଏ ବୃତ୍ତର ବ୍ୟାସ \overline{PQ} ଏବଂ \overline{AB} ଏକ ଜ୍ୟା । $\overline{PQ} \perp \overline{AB}$ ଏବଂ \overline{PQ} ଓ \overline{AB} ର ଛେଦବିନ୍ଦୁ K । ଯଦି $PQ = 26$ ସେ.ମି. ଓ $KQ = 8$ ସେ.ମି. ହୁଏ, ତେବେ \overline{AB} ର ଦୈର୍ଘ୍ୟ କେତେ ସେ.ମି. ?

- (A) 10
 (B) 12
 (C) 20
 (D) 24

(Space For Rough Work)

30. If $(4x^2 + xy) : (3xy - y^2) = 12 : 5$,
what is $\frac{x}{y}$ equal to ?

(A) $\frac{3}{4}$ or $\frac{4}{5}$

(B) $\frac{4}{5}$ or $\frac{5}{6}$

(C) $\frac{5}{6}$ or $\frac{6}{7}$

(D) $\frac{6}{7}$ or $\frac{7}{8}$

31. The ratio between two numbers is $5 : 6$ and their L.C.M. is 150. What is the difference between the numbers ?

(A) 5

(B) 7

(C) 8

(D) 10

30. $(4x^2 + xy) : (3xy - y^2) = 12 : 5$
ହେଲେ, $\frac{x}{y}$ ର ମାନ କେତେ ?

(A) $\frac{3}{4}$ ବା $\frac{4}{5}$

(B) $\frac{4}{5}$ ବା $\frac{5}{6}$

(C) $\frac{5}{6}$ ବା $\frac{6}{7}$

(D) $\frac{6}{7}$ ବା $\frac{7}{8}$

31. ଦୁଇଟି ସଂଖ୍ୟା ମଧ୍ୟରେ ଅନୁପାତ $5 : 6$ । ସେ ସଂଖ୍ୟା ଦୁଇଟିର ଲଃସା:ଗୁ: 150 ହେଲେ, ସଂଖ୍ୟା ଦୁଇଟି ମଧ୍ୟରେ ପାର୍ଥକ୍ୟ କେତେ ?

(A) 5

(B) 7

(C) 8

(D) 10

(Space For Rough Work)

34. Given that $\log 8 = p$ and $\log 9 = q$.
Which of the following cannot be determined using the above data ?

- (A) $\log 15$
(B) $\log 16$
(C) $\log 17$
(D) $\log 18$

35. If $a : b = 5 : 3$, what is the value of $(5a + 8b) : (6a - 7b)$?

- (A) $40 : 11$
(B) $49 : 9$
(C) $51 : 7$
(D) $55 : 6$

34. ବର ଅଛି, $\log 8 = p$ ଓ $\log 9 = q$ । ଉପରିଲିଖିତ ଅଧ୍ୟକ୍ଷ ବ୍ୟବହାର କରି ନିମ୍ନଲିଖିତ କେଉଁଟି ନିର୍ଣ୍ଣୟ କରାଯାଇ ପାରିବ ନାହିଁ ?

- (A) $\log 15$
(B) $\log 16$
(C) $\log 17$
(D) $\log 18$

35. $a : b = 5 : 3$ ହେଲେ,

$(5a + 8b) : (6a - 7b)$ ର ମାନ କେତେ ?

- (A) $40 : 11$
(B) $49 : 9$
(C) $51 : 7$
(D) $55 : 6$

(Space For Rough Work)

37. If $\log 2 = a$ and $\log 3 = b$, what is the value of $\log 1\frac{1}{5}$?

- (A) $2a + b - 1$
 (B) $2a - b + 1$
 (C) $a - 2b + 1$
 (D) $a + 2b - 1$

38. Which of the following is equal to $\frac{\log_3 25 + \log_3 50 - \log_3 2}{\log_3 125}$?

- (A) $\frac{4}{5}$
 (B) $\frac{3}{4}$
 (C) $1\frac{1}{3}$
 (D) $1\frac{1}{4}$

37. $\log 2 = a$ ଏବଂ $\log 3 = b$ ହେଲେ, $\log 1\frac{1}{5}$ ର ମାନ କେତେ ?

- (A) $2a + b - 1$
 (B) $2a - b + 1$
 (C) $a - 2b + 1$
 (D) $a + 2b - 1$

38. ନିମ୍ନ କେଉଁଟି $\frac{\log_3 25 + \log_3 50 - \log_3 2}{\log_3 125}$ ସହ ସମାନ ?

- (A) $\frac{4}{5}$
 (B) $\frac{3}{4}$
 (C) $1\frac{1}{3}$
 (D) $1\frac{1}{4}$

(Space For Rough Work)

41. For what integral value of x ,

$$2^{2x+1} - 9 \times 2^x + 10 = 0 ?$$

- (A) 2
- (B) -2
- (C) 1
- (D) -1

42. If $a^m = b^n = p$ and $b^x = a^y = q$, then which of the following is true ?

- (A) $pq = mn + xy$
- (B) $pq = mn - xy$
- (C) $mx - ny = 0$
- (D) $mx + ny = 0$

41. x ର କେଉଁ ପୂର୍ଣ୍ଣସଂଖ୍ୟା ମାନ ଲାଗି

$$2^{2x+1} - 9 \times 2^x + 10 = 0 ?$$

- (A) 2
- (B) -2
- (C) 1
- (D) -1

42. $a^m = b^n = p$ ଏବଂ $b^x = a^y = q$, ହେଲେ, ନିମ୍ନସ୍ଥ କେଉଁଟି ସତ୍ୟ ?

- (A) $pq = mn + xy$
- (B) $pq = mn - xy$
- (C) $mx - ny = 0$
- (D) $mx + ny = 0$

(Space For Rough Work)

45. If a block of wood in the shape of a right circular cylinder, with diameter equal to height, is reshaped into a sphere of maximum size, what will be the ratio of the surface areas of the original shape and the new shape ?

- (A) 4 : 3
(B) 3 : 2
(C) 2 : 3
(D) 3 : 4

46. One diagonal of a rhombus and a side of it are equal in length. If the area of the rhombus is $72\sqrt{3}$ cm², what is its perimeter in cm. ?

- (A) 36
(B) 48
(C) 54
(D) 60

45. ଗୋଟିଏ ସରଳ ବୃତ୍ତ ଉପିକ ସିଲିଣ୍ଡର ଆକୃତି ବିଶିଷ୍ଟ କାଠ ଖଣ୍ଡର ବ୍ୟାସ ଓ ଉଚ୍ଚତା ସମାନ । ଏଥିରୁ ଏକ ବୃହତ୍ତମ ଗୋଲକ ଆକୃତି ବିଶିଷ୍ଟ ବସ୍ତୁ ପ୍ରସ୍ତୁତ କଲେ, ପୂର୍ବରୁ ଥିବା ସମଗ୍ର ପୃଷ୍ଠତଳ ଓ ପରେ ଉତ୍ପନ୍ନ ହୋଇଥିବା ସମଗ୍ର ପୃଷ୍ଠତଳର କ୍ଷେତ୍ରଫଳର ଅନୁପାତ କେତେ ?

- (A) 4 : 3
(B) 3 : 2
(C) 2 : 3
(D) 3 : 4

46. ଏକ ରମ୍ଭସର ଗୋଟିଏ କର୍ଣ୍ଣର ଦୈର୍ଘ୍ୟ, ଏହାର ଏକ ବାହୁର ଦୈର୍ଘ୍ୟ ସହ ସମାନ ଏବଂ ଏହାର କ୍ଷେତ୍ରଫଳ $72\sqrt{3}$ ବର୍ଗ ସେ.ମି. ହେଲେ, ଏହାର ପରିସୀମା କେତେ ସେ.ମି. ?

- (A) 36
(B) 48
(C) 54
(D) 60

(Space For Rough Work)

49. What is the ratio between the area of an equilateral triangle and that of a square if their perimeters are equal ?

- (A) $4\sqrt{3} : 3$
 (B) $4 : 3\sqrt{3}$
 (C) $3\sqrt{3} : 4$
 (D) $3 : 4\sqrt{3}$

50. What is the median of the odd numbers that lie between 25 and 61 ?

- (A) 42
 (B) 43
 (C) 44
 (D) 45

51. What is the mean of the integers from -8 to $+14$?

- (A) 7
 (B) 6
 (C) 4
 (D) 3

49. ସମାନ ପରିସୀମା ବିଶିଷ୍ଟ ଗୋଟିଏ ସମବାହୁ ତ୍ରିଭୁଜ ଓ ଗୋଟିଏ ବର୍ଗକ୍ଷେତ୍ରର କ୍ଷେତ୍ରଫଳର ଅନୁପାତ କେତେ ?

- (A) $4\sqrt{3} : 3$
 (B) $4 : 3\sqrt{3}$
 (C) $3\sqrt{3} : 4$
 (D) $3 : 4\sqrt{3}$

50. 25 ଓ 61 ମଧ୍ୟବର୍ତ୍ତୀ ଅଯୁଗ୍ମ ସଂଖ୍ୟାମାନଙ୍କର ମାଧ୍ୟମା କେତେ ?

- (A) 42
 (B) 43
 (C) 44
 (D) 45

51. -8 ଠାରୁ $+14$ ପର୍ଯ୍ୟନ୍ତ ପୂର୍ଣ୍ଣସଂଖ୍ୟାମାନଙ୍କର ମାଧ୍ୟମାନ କେତେ ?

- (A) 7
 (B) 6
 (C) 4
 (D) 3

(Space For Rough Work)

54. What is the rational equivalence of $0.\overline{321}$

- (A) $\frac{47}{135}$
 (B) $\frac{49}{145}$
 (C) $\frac{51}{155}$
 (D) $\frac{53}{165}$

54. $0.\overline{321}$ ର ପରିମେୟ ମାନ କେତେ ?

- (A) $\frac{47}{135}$
 (B) $\frac{49}{145}$
 (C) $\frac{51}{155}$
 (D) $\frac{53}{165}$

55. Which of the following does not lie between $\frac{3}{4}$ and $\frac{4}{5}$

- (A) $\frac{31}{40}$
 (B) $\frac{49}{60}$
 (C) $\frac{61}{80}$
 (D) $\frac{91}{120}$

55. ନିମ୍ନଲିଖିତ କେଉଁଟି $\frac{3}{4}$ ଓ $\frac{4}{5}$ ମଧ୍ୟରେ ନୁହେଁ ?

- (A) $\frac{31}{40}$
 (B) $\frac{49}{60}$
 (C) $\frac{61}{80}$
 (D) $\frac{91}{120}$

(Space For Rough Work)

58. If $\log_{10} p^2 = a - \log_{10} q^3$, then what is the value of p^{-2} ?

(A) $\frac{q^3}{10^{-a}}$

(B) $q^3 \cdot 10^{-a}$

(C) $q^3 + 10^{-a}$

(D) $q^3 - 10^{-a}$

59. If $x^2 - 7xy + y^2 = 0$, then which of the following is equal to $\frac{1}{2}(\log x + \log y)$?

(A) $\log(x - y)^3$

(B) $\log(x + y)^3$

(C) $\log \frac{x-y}{3}$

(D) $\log \frac{x+y}{3}$

58. $\log_{10} p^2 = a - \log_{10} q^3$ ହେଲେ, p^{-2} ର ମାନ କେତେ ?

(A) $\frac{q^3}{10^{-a}}$

(B) $q^3 \cdot 10^{-a}$

(C) $q^3 + 10^{-a}$

(D) $q^3 - 10^{-a}$

59. $x^2 - 7xy + y^2 = 0$ ହେଲେ, ନିମ୍ନଲିଖିତ କେଉଁଟି $\frac{1}{2}(\log x + \log y)$ ସହ ସମାନ ?

(A) $\log(x - y)^3$

(B) $\log(x + y)^3$

(C) $\log \frac{x-y}{3}$

(D) $\log \frac{x+y}{3}$

(Space For Rough Work)

62. The product of two consecutive positive even numbers is 224. What is the odd number between them ?

- (A) 11
- (B) 13
- (C) 15
- (D) 17

63. The hypotenuse of a right-triangle is 20 m long. If the difference between the lengths of the other two sides is 4 m, what is length of the shortest side in metres ?

- (A) 12
- (B) 10
- (C) 8
- (D) 6

62. ଦୁଇଟି କ୍ରମିକ ଧନାତ୍ମକ ମୁଗ୍ଧସଂଖ୍ୟାର ଗୁଣଫଳ 224 ହେଲେ, ସେ ସଂଖ୍ୟାଦ୍ୱୟ ମଧ୍ୟବର୍ତ୍ତୀ ଅମୁଗ୍ଧ ସଂଖ୍ୟାଟି କେତେ ?

- (A) 11
- (B) 13
- (C) 15
- (D) 17

63. ଏକ ସମକୋଣୀ ତ୍ରିଭୁଜର କର୍ଣ୍ଣର ଦୈର୍ଘ୍ୟ 20 ମି. ଓ ଅନ୍ୟ ଦୁଇ ବାହୁର ଦୈର୍ଘ୍ୟର ପାର୍ଥକ୍ୟ 4 ମି. ହେଲେ, ତ୍ରିଭୁଜର ସ୍ୱତନ୍ତ୍ର ବାହୁର ଦୈର୍ଘ୍ୟ କେତେ ମିଟର ?

- (A) 12
- (B) 10
- (C) 8
- (D) 6

(Space For Rough Work)

66. What is the discriminant of the equation

$$ax^2 + (c + 2a)x + (b + c) = 0 ?$$

(A) $a^2 - 4ab + 4c^2$

(B) $a^2 + 4ab + 4c^2$

(C) $4a^2 + 4ab + c^2$

(D) $4a^2 - 4ab + c^2$

67. If one root of the equation $x^2 - px + q = 0$ is two times the other one, then which of the following is true ?

(A) $p^2 - 9q = 0$

(B) $2p^2 - 9q = 0$

(C) $p^2 + 9q = 0$

(D) $2p^2 + 9q = 0$

66. $ax^2 + (c + 2a)x + (b + c) = 0$

ସମୀକରଣର ପ୍ରଭେଦକ କେତେ ?

(A) $a^2 - 4ab + 4c^2$

(B) $a^2 + 4ab + 4c^2$

(C) $4a^2 + 4ab + c^2$

(D) $4a^2 - 4ab + c^2$

67. $x^2 - px + q = 0$ ସମୀକରଣର ଗୋଟିଏ ମୂଳ ଅନ୍ୟଟିର ଦୁଇଗୁଣ ହେଲେ, ନିମ୍ନସ୍ଥ କେଉଁଟି ଠିକ ?

(A) $p^2 - 9q = 0$

(B) $2p^2 - 9q = 0$

(C) $p^2 + 9q = 0$

(D) $2p^2 + 9q = 0$

(Space For Rough Work)

70. In an examination, the mean mark of the boys of a class is 87 and that of the girls is 3 less. If the boys and the girls in the class are 18 and 12 respectively, what is the mean mark of the whole class

- (A) 84.4
(B) 84.8
(C) 85.4
(D) 85.8

71. In $\triangle ABC$, $\angle ABC$ is a right angle and $\overline{BD} \perp \overline{AC}$. If $AD = a$ cm and $CD = b$ cm, what is the length of \overline{BD} ?

- (A) $\sqrt{a+b}$
(B) $\sqrt{a} + \sqrt{b}$
(C) $\sqrt{a \times b}$
(D) $\sqrt{a^2 + b^2}$

70. ଏକ ପରୀକ୍ଷାରେ ଗୋଟିଏ ଶ୍ରେଣୀରେ ଥିବା ବାଳକମାନଙ୍କର ନମ୍ବରର ମାଧ୍ୟମାନ ଥିଲା 87 ଏବଂ ବାଳିକାମାନଙ୍କର ନମ୍ବରର ମାଧ୍ୟମାନ ଥିଲା 3 କମ୍ । ଯଦି ଉକ୍ତ ଶ୍ରେଣୀର ବାଳକ ଓ ବାଳିକା ସଂଖ୍ୟା ଯଥାକ୍ରମେ 18 ଓ 12 ହୋଇଥାଏ, ତେବେ ସେହି ଶ୍ରେଣୀର ସମସ୍ତ ପିଲାଙ୍କର ନମ୍ବରର ମାଧ୍ୟମାନ କେତେ ?

- (A) 84.4
(B) 84.8
(C) 85.4
(D) 85.8

71. $\triangle ABC$ ରେ, $\angle ABC$ ସମକୋଣ ଏବଂ $\overline{BD} \perp \overline{AC}$ । ଯଦି $AD = a$ ସେ.ମି. ଓ $CD = b$ ସେ.ମି ହୁଏ, ତେବେ \overline{BD} ର ଦୈର୍ଘ୍ୟ କେତେ ?

- (A) $\sqrt{a+b}$
(B) $\sqrt{a} + \sqrt{b}$
(C) $\sqrt{a \times b}$
(D) $\sqrt{a^2 + b^2}$

(Space For Rough Work)

74. Given $f: x \rightarrow$ highest prime factor of x . Which of the following is the range of 'f', when the domain is $\{12, 13, 14, 15, 16\}$?

(A) $\{2, 3, 5, 7, 13\}$

(B) $\{6, 13, 7, 15, 2\}$

(C) $\{3, 13, 7, 5, 8\}$

(D) $\{3, 1, 7, 5, 2\}$

75. Which of the following values of x and y do not satisfy the equation $\log_a x - 2y = 0$ when $a = 2$?

(A) $x = 1, y = 0$

(B) $x = 4, y = 1$

(C) $x = 16, y = 2$

(D) $x = 32, y = 4$

74. ଦତ୍ତ ଅଛି $f: x \rightarrow$ x ର ବୃହତ୍ତମ ମୌଳିକ ଗୁଣନୀୟକ । ନିମ୍ନଲିଖିତ କେଉଁଟି f ର ବିସ୍ତାର, ଯଦି ପରିସର $\{12, 13, 14, 15, 16\}$ ହୁଏ ?

(A) $\{2, 3, 5, 7, 13\}$

(B) $\{6, 13, 7, 15, 2\}$

(C) $\{3, 13, 7, 5, 8\}$

(D) $\{3, 1, 7, 5, 2\}$

75. x ଓ y ର ନିମ୍ନଲିଖିତ କେଉଁ ମାନ ଦ୍ୱାରା ସମୀକରଣ $\log_a x - 2y = 0$ ସିଦ୍ଧ ହୁଏ ନାହିଁ ଯେଉଁଠି $a = 2$?

(A) $x = 1, y = 0$

(B) $x = 4, y = 1$

(C) $x = 16, y = 2$

(D) $x = 32, y = 4$

(Space For Rough Work)

77.(a) Pressure exerted by a body of mass 20 kg supported by a base-area of 250 cm^2 is $8 \times 10^3 \text{ N/m}^2$

(b) Liquid pressure depends on the shape and size of the container.

(c) The pressure at a point within the liquid depends on its depth from the surface of the liquid.

(A) (a) and (b) are correct, (c) is wrong

(B) (b) and (c) are wrong, (a) is correct

(C) (b) is wrong, (a) and (c) are correct

(D) (a), (b) and (c) are correct

78. The weight of a stone is 100g in air. When it is dipped in kerosene, it weighs 75g and in salt solution 60g. The relative density of salt solution with respect to that of kerosene would be

(A) 1.6

(B) 6.1

(C) 2.6

(D) 6.0

77.(a) ଏକ 20 kg ବସ୍ତୁ ବିଶିଷ୍ଟ ବସ୍ତୁକୁ 250 cm^2 ଆଧାର ଉପରେ ରଖିଲେ ସୃଷ୍ଟ ଚାପ ହେବ $8 \times 10^3 \text{ N/m}^2$

(b) ତରଳ ପଦାର୍ଥର ଚାପ ଧାରକ (ପାତ୍ର)ର ଆକୃତି ଓ ଆକାର ଉପରେ ନିର୍ଭର କରେ ।

(c) ତରଳ ପଦାର୍ଥର ଏକ ବିନ୍ଦୁରେ ସୃଷ୍ଟ ଚାପ ତରଳ ପଦାର୍ଥର ପୃଷ୍ଠରୁ ବିନ୍ଦୁର ଗଭୀରତା ଉପରେ ନିର୍ଭର କରେ ।

(A) (a) ଓ (b) ଠିକ୍, (c) ଭୁଲ୍

(B) (b) ଓ (c) ଭୁଲ୍, (a) ଠିକ୍

(C) (b) ଭୁଲ୍, (a) ଓ (c) ଠିକ୍

(D) (a), (b) ଓ (c) ଠିକ୍

78. ଖଣ୍ଡ ପଥରର ବାୟୁରେ ଓଜନ 100 ଗ୍ରାମ୍ ଅଟେ । ତାହାକୁ କିରୋସିନ୍‌ରେ ବୁଡ଼ାଇଲେ ଓଜନ 75 ଗ୍ରାମ୍ ଏବଂ ଲୁଣ ପାଣିରେ ବୁଡ଼ାଇଲେ 60 ଗ୍ରାମ୍ ହୁଏ । ତେବେ କିରୋସିନ୍ ସହ ଲୁଣପାଣିର ଆପେକ୍ଷିକ ସାନ୍ଦ୍ରତା ହେବ,

(A) 1.6

(B) 6.1

(C) 2.6

(D) 6.0

(Space For Rough Work)

80. Which one/are of the following represent(s) acceleration ?

(a) $\frac{v^2 - u^2}{2s}$

(b) $\frac{2(s - ut)}{t^2}$

(c) $\frac{v - u}{t}$

(A) (a) is wrong, (b) and (c) are correct

(B) (a) and (c) are correct, (b) is wrong

(C) (c) is correct, (a) and (b) are wrong

(D) (a), (b) and (c) are correct

80. ନିମ୍ନୋକ୍ତ ମଧ୍ୟରୁ କେଉଁଟି/କେଉଁଗୁଡ଼ିକ ତ୍ୱରଣକୁ ସୂଚାଏ ?

(a) $\frac{v^2 - u^2}{2s}$

(b) $\frac{2(s - ut)}{t^2}$

(c) $\frac{v - u}{t}$

(A) (a) ଭୁଲ, (b) ଓ (c) ଠିକ୍

(B) (a) ଓ (c) ଠିକ୍, (b) ଭୁଲ

(C) (c) ଠିକ୍, (a) ଓ (b) ଭୁଲ

(D) (a), (b) ଓ (c) ଠିକ୍

(Space For Rough Work)

82. What time would be required to fill completely a tank of 18,000 litres capacity by water pulled from a depth of 7.46 m by a motor of 1.5 H.P ?

- (A) 10 minutes
- (B) 15 minutes
- (C) 18 minutes
- (D) 20 minutes

83. If two bodies A and B of masses M_1 and M_2 respectively ($M_1 > M_2$) have the same momentum, then

- (a) Energy of $A >$ Energy of B
 - (b) Velocity of $A >$ Velocity of B
 - (c) Energy of $B >$ Energy of A
 - (d) Velocity of $B >$ Velocity of A
- (A) (a) and (d) are correct, (b) and (c) are wrong
 - (B) (a) and (b) are wrong, (c) and (d) are correct
 - (C) (b) and (c) are correct, (a) and (d) are wrong
 - (D) (a) and (c) are correct, (b) and (d) are wrong

82. 18,000 ଲିଟର ଜଳଧରୁଥିବା ଏକ ଟାଙ୍କରେ 7.46 ମିଟର ତଳୁ ପାଣିଟାଣି ସଂପୂର୍ଣ୍ଣଭାବେ ଭରିବାକୁ ଏକ 1.5 ଅଶ୍ୱକ୍ଷମତା ବିଶିଷ୍ଟ ମୋଟରକୁ କେତେ ସମୟ ଲାଗିବ ?

- (A) 10 ମିନିଟ୍
- (B) 15 ମିନିଟ୍
- (C) 18 ମିନିଟ୍
- (D) 20 ମିନିଟ୍

83. ଦୁଇଟି ବସ୍ତୁ A ଓ B ର ବସ୍ତୁତ୍ୱ ଯଥାକ୍ରମେ M_1 ଓ M_2 ($M_1 > M_2$) ଅଟେ । ଯଦି ସେଗୁଡ଼ିକର ସଂବେଗ ସମାନ ହୁଏ, ତେବେ

- (a) A ର ଶକ୍ତି $>$ B ର ଶକ୍ତି
 - (b) A ର ପରିବେଗ $>$ B ର ପରିବେଗ
 - (c) B ର ଶକ୍ତି $>$ A ର ଶକ୍ତି
 - (d) B ର ପରିବେଗ $>$ A ର ପରିବେଗ
- (A) (a) ଓ (d) ଠିକ୍, (b) ଓ (c) ଭୁଲ୍
 - (B) (a) ଓ (b) ଭୁଲ୍, (c) ଓ (d) ଠିକ୍
 - (C) (b) ଓ (c) ଠିକ୍, (a) ଓ (d) ଭୁଲ୍
 - (D) (a) ଓ (c) ଠିକ୍, (b) ଓ (d) ଭୁଲ୍

(Space For Rough Work)

86. A 1.0 m long metallic wire of uniform cross-section is drawn into a 3.0 m long wire of uniform cross-section. What would be the resistance of the new wire compared to that of the original wire ?

(A) 3 times

(B) 9 times

(C) $\frac{1}{3}$ times

(D) $\frac{1}{9}$ times

86. ଏକ ସମମୋଟେଇ ବିଶିଷ୍ଟ 1.0 ମିଟର ଲମ୍ବର ଧାତବ ତାରକୁ ଟାଣି ସମମୋଟେଇ ବିଶିଷ୍ଟ 3.0 ମିଟର ଲମ୍ବ କରାଗଲା । ନୂତନ ତାରର ପ୍ରତିରୋଧ ମୂଳ ତାରର ପ୍ରତିରୋଧର କେତେ ଗୁଣ ହେବ ?

(A) 3 ଗୁଣ

(B) 9 ଗୁଣ

(C) $\frac{1}{3}$ ଗୁଣ

(D) $\frac{1}{9}$ ଗୁଣ

(Space For Rough Work)

88. (a) A fuse-wire is made of an alloy of copper and tin.
 (b) The house-hold wirings are parallel ones.
 (c) Out of the two bulbs, the one which has filament resistance more, will glow more brightly.

- (A) (a) and (c) are wrong, (b) is correct
 (B) (a) and (b) are correct, (c) is wrong
 (C) (a) is correct, (b) and (c) are wrong
 (D) (a), (b) and (c) are correct

88. (a) ଫିଉଜ୍ ତାର ତମ୍ବା ଓ ଟିନ୍ର ଏକ ମିଶ୍ର-ଧାତୁରେ ନିର୍ମିତ ।
 (b) ଗୃହ ଓ୍ଵାୟରିଂଗୁଡ଼ିକ ସମାନ୍ତରାଳ ପରିପଥ ଅଟେ ।
 (c) ଦୁଇଟି ବୈଦ୍ୟୁତିକ ବତୀମଧ୍ୟରୁ ଯାହାର ଫିଲାମେଣ୍ଟର ପ୍ରତିରୋଧ ଅଧିକ, ତାହା ଅଧିକ ଉଜ୍ଜ୍ଵଳ ହୋଇ ଜଳିବ ।

- (A) (a) ଓ (c) ଭୁଲ୍, (b) ଠିକ୍
 (B) (a) ଓ (b) ଠିକ୍, (c) ଭୁଲ୍
 (C) (a) ଠିକ୍, (b) ଓ (c) ଭୁଲ୍
 (D) (a), (b) ଓ (c) ଠିକ୍

(Space For Rough Work)

90. A force when acts on a body east-wards, the body is displaced 40 m. When the force of same magnitude acts on the same body (from its new position) south-wards, the body is displaced 30 m. The magnitude of the resultant displacement of the body would be

- (A) 10 m
- (B) 50 m
- (C) 70 m
- (D) 1200 m

91. The momentum of a body of mass 2 kg changes from 80 kg m/s to 50 kg m/s. The change in its kinetic energy would be

- (A) 625 J
- (B) 975 J
- (C) 1200 J
- (D) 1600 J

90. ଗୋଟିଏ ବସ୍ତୁ ଉପରେ ବଳ ପୂର୍ବଦିଗ ଆଡ଼କୁ ପ୍ରୟୋଗ କରିବାରୁ ତାହା 40 ମିଟର ବିସ୍ଥାପିତ ହେଲା । ପୁଣି ବସ୍ତୁର ନୂତନ ଅବସ୍ଥାନରୁ ସେହି ପରିମାଣର ବଳ ଦକ୍ଷିଣ ଦିଗ ଆଡ଼କୁ ପ୍ରୟୋଗ କରିବାରୁ ବସ୍ତୁଟି 30 ମିଟର ବିସ୍ଥାପିତ ହେଲା । ତେବେ ବସ୍ତୁର ପରିଣାମୀ ବିସ୍ଥାପନ ହେବ

- (A) 10 ମିଟର
- (B) 50 ମିଟର
- (C) 70 ମିଟର
- (D) 1200 ମିଟର

91. ଗୋଟିଏ 2 kg ବସ୍ତୁର ବିଶିଷ୍ଟ ବସ୍ତୁର ସଂବେଗ 80 kg m/s ରୁ 50 kg m/s କୁ ପରିବର୍ତ୍ତନ ହେଲେ, ତାହାର ଗତିଜ ଶକ୍ତିର ପରିବର୍ତ୍ତନ ହେବ

- (A) 625 ଜୁଲ
- (B) 975 ଜୁଲ
- (C) 1200 ଜୁଲ
- (D) 1600 ଜୁଲ

(Space For Rough Work)

94. For what properties, mercury is used as the thermometric substance ?

- (a) Due to its high thermal expansion.
- (b) Due to its high density.
- (c) Due to its greater specific heat.
- (d) Due to its property of non-sticking to glass.

- (A) (a) and (d) are wrong, (b) and (c) are correct
- (B) (b) and (d) are correct, (a) and (c) are wrong
- (C) (a) and (b) are wrong, (c) and (d) are correct
- (D) (b) and (c) are wrong, (a) and (d) are correct

95. What would be the temperature of the mixture when 2 litres of water at 10°C is mixed with 5 litres of water at 80°C ?

- (A) 35°C
- (B) 45°C
- (C) 60°C
- (D) 70°C

94. ପାରଦର କେଉଁ କେଉଁ ଗୁଣ ଯୋଗୁଁ ତାହାକୁ ତାପମାନ ଯନ୍ତ୍ରରେ ବ୍ୟବହାର କରାଯାଏ ?

- (a) ଏହାର ଅଧିକ ତାପୀୟ ପ୍ରସାରଣ ଗୁଣ ଯୋଗୁଁ
- (b) ଏହାର ଅଧିକ ସାନ୍ଦ୍ରତା ଯୋଗୁଁ
- (c) ଏହାର ଅଧିକ ବିଶିଷ୍ଟ ତାପ ଯୋଗୁଁ
- (d) ଏହା କାଚରେ ଲାଗିରହେ ନାହିଁ

- (A) (a) ଓ (d) ଭୁଲ, (b) ଓ (c) ଠିକ
- (B) (b) ଓ (d) ଠିକ, (a) ଓ (c) ଭୁଲ
- (C) (a) ଓ (b) ଭୁଲ, (c) ଓ (d) ଠିକ
- (D) (b) ଓ (c) ଭୁଲ, (a) ଓ (d) ଠିକ

95. 10°C ତାପମାତ୍ରା ବିଶିଷ୍ଟ 2 ଲିଟର ଜଳସହ 80°C ତାପମାତ୍ରା ବିଶିଷ୍ଟ 5 ଲିଟର ଜଳ ମିଶାଇଲେ ମିଶ୍ରଣର ତାପମାତ୍ରା କେତେ ହେବ ?

- (A) 35°C
- (B) 45°C
- (C) 60°C
- (D) 70°C

(Space For Rough Work)

97. Two electric-bulbs P and Q have filament resistance in the ratio of 1 : 2. When they will be connected in parallel to the same source, the ratio of the powers dissipated by them shall respectively be

- (A) 2 : 1
 (B) 1 : 2
 (C) 4 : 1
 (D) 1 : 4

98. A house with mains supply of 220 volts uses five fans each of 100 watt, an electric iron of 500 watt, five bulbs each of 20 watt. The minimum capacity of the fuse wire to be used at the main switch of the house should be

- (A) 15 Amperes
 (B) 10 Amperes
 (C) 5 Amperes
 (D) 2.5 Amperes

97. P ଓ Q ଦୁଇଟି ବଲ୍‌ବୁର ଫିଲାମେଣ୍ଟ୍‌ର ଇଲେକ୍ଟ୍ରିକ୍ ପ୍ରତିରୋଧର ଅନୁପାତ 1 : 2 ଅଟେ । ସେହି ଦୁଇ ବଲ୍‌ବୁକୁ ସମାନ୍ତରାଳ ପରିପଥରେ ଏକା ବୈଦ୍ୟୁତିକ ଉତ୍ସ ସହ ସଂଯୋଗ କଲେ ସେମାନଙ୍କର ପାୱାର୍ ଶକ୍ତିର ଯଥାକ୍ରମେ ଅନୁପାତ ହେବ

- (A) 2 : 1
 (B) 1 : 2
 (C) 4 : 1
 (D) 1 : 4

98. ଗୋଟିଏ ଘରକୁ 220 ଭୋଲ୍ଟର ବିଦ୍ୟୁତ୍ ଯୋଗାଣ ହେଉଛି ସେହିଘରେ 100 ୱାଟ୍ ବିଶିଷ୍ଟ 5ଟି ଫ୍ୟାନ୍, 500 ୱାଟ୍ ବିଶିଷ୍ଟ ଏକ ଇଲେକ୍ଟ୍ରିକ୍ ଇସ୍ପା, 20 ୱାଟ୍ ବିଶିଷ୍ଟ 5ଟି ବଲ୍‌ବୁ ବ୍ୟବହୃତ ହେବା-ପାଇଁ ସର୍ବନିମ୍ନ କେତେ ମାନର ଫ୍ୟୁଜ୍‌ର ଶୁଖ୍ୟ ସ୍ଥିରରେ ବ୍ୟବହୃତ ହେବା ଆବଶ୍ୟକ ?

- (A) 15 ଆମ୍ପିୟର
 (B) 10 ଆମ୍ପିୟର
 (C) 5 ଆମ୍ପିୟର
 (D) 2.5 ଆମ୍ପିୟର

(Space For Rough Work)

3. On heating 10g of calcium carbonate how much carbondioxide at NTP would be formed ?

(A) 22.4 l

(B) 11.2 l

(C) 4.48 l

(D) 2.24 l

4. Which one was discovered by using perforated cathode in the crooke's tube ?

(A) Electron

(B) Proton

(C) Neutron

(D) Nucleus

3. 10 ଗ୍ରା. କାଲ୍‌ସିୟମ୍ କାର୍ବୋନେଟ୍‌କୁ ଉତ୍ତପ୍ତ କଲେ ମାନକ ତାପ ଓ ତାପ ମାତ୍ରାରେ କେତେ କାର୍ବନ୍-ଡାଇଅକ୍‌ସାଇଡ୍ ଉତ୍ପନ୍ନ ହେବ ?

(A) 22.4 ଲି.

(B) 11.2 ଲି.

(C) 4.48 ଲି.

(D) 2.24 ଲି.

4. କ୍ରୁକ୍‌ଙ୍କ ନଳୀରେ ଉତ୍ତପ୍ତ କ୍ୟାଥୋଡ୍ ବ୍ୟବହାର କରିବାରୁ କେଉଁଟି ଆବିଷ୍କୃତ ହେଲା ?

(A) ଇଲେକ୍‌ଟ୍ରନ୍

(B) ପ୍ରୋଟନ୍

(C) ନ୍ୟୁଟ୍ରନ୍

(D) ନ୍ୟୁକ୍ଲିୟସ୍

(Space For Rough Work)

7. (a) Hydrogen has the highest calorific value as compared to that of other gaseous fuels.
- (b) It can be obtained cheaply from water.
- (c) It is not used as a domestic fuel due to its explosive nature.

- (A) (a) and (b) are correct and (c) is wrong
- (B) (b) and (c) are correct and (a) is wrong
- (C) (c) and (a) are correct and (b) is wrong
- (D) (a), (b) and (c) are correct

7. (a) ଅନ୍ୟାନ୍ୟ ଗ୍ୟାସୀୟ ଜଳନ ତୁଳନାରେ ହାଇଡ୍ରୋଜେନ୍‌ର କ୍ୟାଲୋରୀମୂଲ୍ୟ ସର୍ବାଧିକ ଅଟେ ।
- (b) ଶିଫ୍ଟାରେ ଏହା ଜଳରୁ ପ୍ରସ୍ତୁତ କରାଯାଇପାରିବ ।
- (c) ଏହାର ବିସ୍ଫୋରକ ଧର୍ମଯୋଗୁଁ ଏହାକୁ ଘରୋଇ ଜଳନ ରୂପେ ବ୍ୟବହାର କରାଯାଇ ନାହିଁ ।

- (A) (a) ଓ (b) ଠିକ୍ ଏବଂ (c) ଭୁଲ୍
- (B) (b) ଓ (c) ଠିକ୍ ଏବଂ (a) ଭୁଲ୍
- (C) (c) ଓ (a) ଠିକ୍ ଏବଂ (b) ଭୁଲ୍
- (D) (a), (b) ଓ (c) ଠିକ୍

(Space For Rough Work)

10. Which sequence of the scientists associated with the sequential discovery of the sub-atomic particles is correct ?

- (A) Thomson-Rutherford-Goldstein-Chadwick
- (B) Rutherford-Bohr-Thomson-Millikan
- (C) Thomson-Goldstein-Rutherford-Chadwick
- (D) Millikan-Goldstein-Bohr-Rutherford.

11. In the modern periodic table, the number of valency electrons of the elements

- (A) increases along a group
- (B) increases along a period
- (C) decreases along a group
- (D) decreases along a period

10. ପରମାଣୁର କଣିକାଗୁଡ଼ିକର କ୍ରମାବଳୀ ଆବିଷ୍କାର ସହ ଜଡ଼ିତ ବୈଜ୍ଞାନିକମାନଙ୍କର କେଉଁ କ୍ରମଟି ଠିକ୍ ?

- (A) ଥମସନ୍-ରଥର୍ଫୋର୍ଡ୍-ଗୋଲ୍ଡଷ୍ଟାଇନ୍-ଚାଡ଼ୱିକ୍
- (B) ରଥର୍ଫୋର୍ଡ୍-ବୋହର୍-ଥମସନ୍-ମିଲିକାନ୍
- (C) ଥମସନ୍-ଗୋଲ୍ଡଷ୍ଟାଇନ୍-ରଥର୍ଫୋର୍ଡ୍-ଚାଡ଼ୱିକ୍
- (D) ମିଲିକାନ୍-ଗୋଲ୍ଡଷ୍ଟାଇନ୍-ବୋହର୍-ରଥର୍ଫୋର୍ଡ୍

11. ଆଧୁନିକ ପର୍ଯ୍ୟାୟ ସାରଣୀରେ ମୌଳିକଗୁଡ଼ିକର ସଂଯୋଜକ ଇଲେକ୍ଟ୍ରନ୍ ସଂଖ୍ୟା

- (A) ଏକ ଗୁପ୍ତରେ ବୃଦ୍ଧି ହୋଇଥାଏ
- (B) ଏକ ପର୍ଯ୍ୟାୟରେ ବୃଦ୍ଧି ହୋଇଥାଏ
- (C) ଏକ ଗୁପ୍ତରେ ହ୍ରାସ ହୋଇଥାଏ
- (D) ଏକ ପର୍ଯ୍ୟାୟରେ ହ୍ରାସ ହୋଇଥାଏ

(Space For Rough Work)

13. (a) One molecule of Ammonium phosphate.
(b) Two molecules of Potassium dichromate
(c) Three molecules of Sodium silicate

Considering the total number of atoms in each of the above cases, which one of the following sequences is correct ?

- (A) $a b c$
(B) $b c a$
(C) $c a b$
(D) None of these

13. (a) ଏମୋନିୟମ ଫସଫେଟର ଏକ ଅଣୁ
(b) ପୋଟାସିୟମ ଡାଇକ୍ରୋମେଟର ଦୁଇଟି ଅଣୁ
(c) ସୋଡ଼ିୟମ ସିଲିକେଟର ତିନୋଟି ଅଣୁ
- ଉପରୋକ୍ତ ପ୍ରତ୍ୟେକ କ୍ଷେତ୍ରରେ ମୋଟ ପରମାଣୁ ସଂଖ୍ୟାକୁ ଭିତ୍ତି କରି ନିମ୍ନୋକ୍ତ ମଧ୍ୟରୁ କେଉଁ କ୍ରମଟି ଠିକ୍ ?

- (A) $a b c$
(B) $b c a$
(C) $c a b$
(D) ଏଥୁମଧ୍ୟରୁ କୌଣସିଟି ନୁହେଁ

(Space For Rough Work)

16. Which one yields least number of hydrogen ions in aqueous solution ?

- (A) Carbonic acid
- (B) Sulphuric acid
- (C) Nitric acid
- (D) Hydro-chloric acid

16. କେଉଁଟି ଜଳୀୟ ଦ୍ରବଣରେ ସର୍ବନିମ୍ନ ସଂଖ୍ୟକ ହାଇଡ୍ରୋଜେନ୍ ଆୟନ ସୃଷ୍ଟି କରେ ?

- (A) କାର୍ବୋନିକ୍ ଏସିଡ୍
- (B) ସଲ୍‌ଫୁରିକ୍ ଏସିଡ୍
- (C) ନାଇଟ୍ରିକ୍ ଏସିଡ୍
- (D) ହାଇଡ୍ରୋକ୍ଲୋରିକ୍ ଏସିଡ୍ ।

17. (a) Sodium Chloride is available as a mineral.

- (b) Sodium Chloride is used as a medicine.
- (c) Sodium Chloride is available only from sea-water.

- (A) (a) and (b) are correct and (c) is wrong
- (B) (b) and (c) are correct and (a) is wrong
- (C) (c) and (a) are correct and (b) is wrong
- (D) (a), (b) and (c) are correct

17. (a) ସୋଡ଼ିୟମ୍ କ୍ଲୋରାଇଡ୍ ଖଣିଜରୂପେ ଉପଲବ୍ଧ ହୋଇଥାଏ ।

- (b) ସୋଡ଼ିୟମ୍ କ୍ଲୋରାଇଡ୍ ଔଷଧରୂପେ ବ୍ୟବହୃତ ହୁଏ ।
- (c) ସୋଡ଼ିୟମ୍ କ୍ଲୋରାଇଡ୍ କେବଳ ସମୁଦ୍ର ଜଳରୁ ଉପଲବ୍ଧ ହୋଇଥାଏ ।

- (A) (a) ଓ (b) ଠିକ୍ ଏବଂ (c) ଭୁଲ୍
- (B) (b) ଓ (c) ଠିକ୍ ଏବଂ (a) ଭୁଲ୍
- (C) (c) ଓ (a) ଠିକ୍ ଏବଂ (b) ଭୁଲ୍
- (D) (a), (b) ଓ (c) ଠିକ୍

(Space For Rough Work)

DET/CHEM (3)

20. $\text{Cu} + \text{I}_2 = \text{CuI}_2$
- (a) This is a combination reaction.
(b) This is a redox reaction.
(c) This is not a redox reaction.
- (A) (a) and (b) are correct and (c) is wrong
(B) (a) and (c) are correct and (b) is wrong
(C) only (a) is correct
(D) only (b) is correct

21. ${}^m_n\text{E}$ where
'E' is an element and 'm' and 'n' carry their usual meanings. E will have
- (A) m number of protons and n number of neutrons
(B) n number of protons and m number of neutrons
(C) m number of protons and $(n - m)$ number of neutrons
(D) n number of protons and $(m - n)$ number of neutrons

20. $\text{Cu} + \text{I}_2 = \text{CuI}_2$
- (a) ଏହା ଏକ ସଂଶ୍ଳେଷଣ ପ୍ରତିକ୍ରିୟା ଅଟେ ।
(b) ଏହା ଏକ ରେଡ଼କ୍ସ ପ୍ରତିକ୍ରିୟା ଅଟେ ।
(c) ଏହା ଏକ ରେଡ଼କ୍ସ ପ୍ରତିକ୍ରିୟା ନୁହେଁ ।
- (A) (a) ଓ (b) ଠିକ୍ ଏବଂ (c) ଭୁଲ୍
(B) (a) ଓ (c) ଠିକ୍ ଏବଂ (b) ଭୁଲ୍
(C) କେବଳ (a) ଠିକ୍
(D) କେବଳ (b) ଠିକ୍

21. ${}^m_n\text{E}$ ଯେଉଁଠି
'E' ଏକ ମୌଳିକ ଅଟେ ଏବଂ 'm' ଓ 'n' ସେମାନଙ୍କର ସ୍ୱାଭାବିକ ଅର୍ଥ ବହନ କରନ୍ତି । E ରେ ଥିବ
- (A) m ସଂଖ୍ୟକ ପ୍ରୋଟନ୍ ଏବଂ n ସଂଖ୍ୟକ ନ୍ୟୁଟ୍ରନ୍
(B) n ସଂଖ୍ୟକ ପ୍ରୋଟନ୍ ଏବଂ m ସଂଖ୍ୟକ ନ୍ୟୁଟ୍ରନ୍
(C) m ସଂଖ୍ୟକ ପ୍ରୋଟନ୍ ଏବଂ $(n - m)$ ସଂଖ୍ୟକ ନ୍ୟୁଟ୍ରନ୍
(D) n ସଂଖ୍ୟକ ପ୍ରୋଟନ୍ ଏବଂ $(m - n)$ ସଂଖ୍ୟକ ନ୍ୟୁଟ୍ରନ୍

(Space For Rough Work)

24. (a) Nichrome is a non-ferrous alloy.
(b) An amalgam is an alloy
(c) 22 carat gold is an alloy.
- (A) (a) and (b) are correct and (c) is wrong
(B) (b) and (c) are correct and (a) is wrong
(C) (c) and (a) are correct and (b) is wrong
(D) (a), (b) and (c) are correct

25. (a) LPG is a primary fuel
(b) CNG is a secondary fuel
(c) Kerosene is a primary fuel
- (A) (a) and (c) are correct and (b) is wrong
(B) (b) is correct and (a) and (c) are wrong
(C) (a), (b) and (c) are correct
(D) (a), (b) and (c) are wrong

24. (a) ନିକ୍ରୋମ୍ ଏକ ନିର୍ଜ୍ୱେଶ୍ୟ ଧାତୁ ମିଶ୍ରଣ ଅଟେ ।
(b) ଆମାଲଗାମ୍ ଏକ ମିଶ୍ରଣ ଅଟେ ।
(c) 22 କ୍ୟାରେଟ୍ ସୁନା ଏକ ମିଶ୍ରଣ ଅଟେ ।
- (A) (a) ଓ (b) ଠିକ୍ ଏବଂ (c) ଭୁଲ୍
(B) (b) ଓ (c) ଠିକ୍ ଏବଂ (a) ଭୁଲ୍
(C) (c) ଓ (a) ଠିକ୍ ଏବଂ (b) ଭୁଲ୍
(D) (a), (b) ଓ (c) ଠିକ୍

25. (a) LPG ଏକ ପ୍ରାଥମିକ ଜଳନ ଅଟେ ।
(b) CNG ଏକ ଦ୍ୱିତୀୟକ ଜଳନ ଅଟେ ।
(c) କିରୋସିନ୍ ଏକ ପ୍ରାଥମିକ ଜଳନ ଅଟେ ।
- (A) (a) ଓ (c) ଠିକ୍ ଏବଂ (b) ଭୁଲ୍
(B) (b) ଠିକ୍ ଏବଂ (a) ଓ (c) ଭୁଲ୍
(C) (a), (b) ଓ (c) ଠିକ୍
(D) (a), (b) ଓ (c) ଭୁଲ୍

(Space For Rough Work)

DET/MATH (3)

28. Which of the following is a rational number ?

(A) 1.0233233323333

(B) 2.3055055055

(C) $3 + \sqrt{2}$

(D) $2\pi + 1$

28. ନିମ୍ନଲିଖିତ କେଉଁଟି ଏକ ପରିମେୟ ସଂଖ୍ୟା ?

(A) 1.0233233323333

(B) 2.3055055055

(C) $3 + \sqrt{2}$

(D) $2\pi + 1$

29. Which of the following is a rational number that does not lie between $\sqrt{2}$ and $\sqrt{3}$?

(A) 1.4

(B) 1.5

(C) 1.6

(D) 1.7

29. ନିମ୍ନଲିଖିତ କେଉଁଟି $\sqrt{2}$ ଓ $\sqrt{3}$ ମଧ୍ୟରେ ଅବସ୍ଥିତ ନ ଥିବା ଏକ ପରିମେୟ ସଂଖ୍ୟା ?

(A) 1.4

(B) 1.5

(C) 1.6

(D) 1.7

(Space For Rough Work)

32. Which of the following is equal to

$$\frac{x^{-1}y^{-1} + y^{-1}z^{-1} + z^{-1}x^{-1}}{x + y + z}?$$

- (A) $x^{-1}y^{-1}z^{-1}$
- (B) $xy^{-1}z^{-1}$
- (C) $x^{-1}y^{-1}z$
- (D) $x^{-1}yz^{-1}$

33. For what value of x

$$\sqrt[3]{\left(\frac{p}{q}\right)} = \left(\frac{q}{p}\right)^{1-2x}?$$

- (A) $\frac{2}{3}$
- (B) $\frac{3}{2}$
- (C) $\frac{4}{5}$
- (D) $\frac{5}{4}$

32.

ନିମ୍ନ କେଉଁ $\frac{x^{-1}y^{-1} + y^{-1}z^{-1} + z^{-1}x^{-1}}{x + y + z}$

ସହ ସମାନ ?

- (A) $x^{-1}y^{-1}z^{-1}$
- (B) $xy^{-1}z^{-1}$
- (C) $x^{-1}y^{-1}z$
- (D) $x^{-1}yz^{-1}$

33. x ର କେଉଁ ମାନ ପାଇଁ

$$\sqrt[3]{\left(\frac{p}{q}\right)} = \left(\frac{q}{p}\right)^{1-2x}?$$

- (A) $\frac{2}{3}$
- (B) $\frac{3}{2}$
- (C) $\frac{4}{5}$
- (D) $\frac{5}{4}$

(Space For Rough Work)

36. Which of the following is equal to

$$\left(x^{\frac{2}{3}} - x^{-\frac{2}{3}}\right)\left(x^{-\frac{4}{3}} + 1 + x^{\frac{4}{3}}\right)?$$

(A) $\frac{1-x^4}{x^2}$

(B) $\frac{x^4-1}{x^2}$

(C) $\frac{1+x^2}{x^4}$

(D) $\frac{1-x^2}{x^4}$

36. ନିମ୍ନଲିଖିତ କେଉଁଟି $\left(x^{\frac{2}{3}} - x^{-\frac{2}{3}}\right)\left(x^{-\frac{4}{3}} + 1 + x^{\frac{4}{3}}\right)$

ସହ ସମାନ ?

(A) $\frac{1-x^4}{x^2}$

(B) $\frac{x^4-1}{x^2}$

(C) $\frac{1+x^2}{x^4}$

(D) $\frac{1-x^2}{x^4}$

(Space For Rough Work)

39. If $x + a$ is a common factor of $x^2 + px + q$ and $x^2 + mx + n$, then what is the value of 'a'?

(A) $\frac{n+q}{m-p}$

(B) $\frac{n-q}{m+p}$

(C) $\frac{n+q}{m+p}$

(D) $\frac{n-q}{m-p}$

40. $f(x) = 2x + 3, x \in R$.

What is the value of 'a' if $f(a) = -5$

(A) 1

(B) -2

(C) 3

(D) -4

39. $x^2 + px + q$ ଓ $x^2 + mx + n$ ର $x + a$ ଏକ ସାଧାରଣ ଉତ୍ପାଦକ ହେଲେ, a ର ମାନ କେତେ ?

(A) $\frac{n+q}{m-p}$

(B) $\frac{n-q}{m+p}$

(C) $\frac{n+q}{m+p}$

(D) $\frac{n-q}{m-p}$

40. $f(x) = 2x + 3, x \in R$ ।

a ର କେଉଁ ମାନ ପାଇଁ $f(a) = -5$ ହେବ ?

(A) 1

(B) -2

(C) 3

(D) -4

(Space For Rough Work)

43. If one root of the equation $x^2 - 5x + q = 0$ is 3 more than the other, what is the value of 'q'?

- (A) 2
- (B) -2
- (C) 4
- (D) -4

44. For what value of 'k', the equations $7x - y = 5$ and $21x - 3y = k$ will be mutually consistent and dependent?

- (A) 7
- (B) 10
- (C) 12
- (D) 15

43. ସମୀକରଣ $x^2 - 5x + q = 0$ ର ଗୋଟିଏ ମୂଳ, ଅନ୍ୟଟି ଅପେକ୍ଷା 3 ଅଧିକ ହେଲେ, q ର ମାନ କେତେ ?

- (A) 2
- (B) -2
- (C) 4
- (D) -4

44. k ର କେଉଁ ମାନ ପାଇଁ $7x - y = 5$ ଏବଂ $21x - 3y = k$ ସମୀକରଣ ଦ୍ଵୟ ପରସ୍ପର ସଙ୍ଗତ ଓ ନିର୍ଭରଶୀଳ ହେବେ ?

- (A) 7
- (B) 10
- (C) 12
- (D) 15

(Space For Rough Work)

47. If each side of an equilateral triangle inscribed in a circle is 12 cm long, what is the diameter of the circle in cm?

(A) $8 + \sqrt{3}$

(B) $8\sqrt{3}$

(C) $4 + \sqrt{3}$

(D) $4\sqrt{3}$

48. Three circles, each of radius 7 cm, touch each other externally. How much is the area of the sectors, in cm^2 , enclosed in the triangle formed by joining the centres?

(A) $\frac{77}{2}$

(B) $\frac{77}{3}$

(C) 77

(D) 154

47. ଏକ ବୃତ୍ତରେ ଅନ୍ତର୍ଲିଖିତ ଏକ ସମବାହୁ ତ୍ରିଭୁଜର ପ୍ରତ୍ୟେକ ବାହୁର ଦୈର୍ଘ୍ୟ 12 ସେ.ମି ହେଲେ, ଉକ୍ତ ବୃତ୍ତର ବ୍ୟାସ କେତେ ସେ.ମି. ?

(A) $8 + \sqrt{3}$

(B) $8\sqrt{3}$

(C) $4 + \sqrt{3}$

(D) $4\sqrt{3}$

48. 7 ସେ.ମି. ବାନ୍ଧ ବ୍ୟାସାର୍ଦ୍ଧ ବିଶିଷ୍ଟ ତିନୋଟି ବୃତ୍ତ ପରସ୍ପରକୁ ବହିଃସ୍ପର୍ଶ କରନ୍ତି । କେନ୍ଦ୍ର ତିନୋଟିକୁ ଯୋଗ କରିବାଦ୍ୱାରା ଉତ୍ପନ୍ନ ହୋଇଥିବା ତ୍ରିଭୁଜ ମଧ୍ୟରେ ଅନ୍ତର୍ଲିଖିତ ବୃତ୍ତକଳାଗୁଡ଼ିକର କ୍ଷେତ୍ରଫଳ କେତେ ବର୍ଗ ସେ.ମି. ?

(A) $\frac{77}{2}$

(B) $\frac{77}{3}$

(C) 77

(D) 154

(Space For Rough Work)

52. If the equation $\frac{x^2 - bx}{ax - c} = \frac{m-1}{m+1}$ has roots which have equal absolute values but are of opposite sign, what is the value of 'm'?

(A) $\frac{a+b}{a-b}$

(B) $\frac{a-b}{a+b}$

(C) $\frac{2a+b}{a-b}$

(D) $\frac{2a-b}{a+b}$

53. What is the area, in sq.cm, of the largest triangle that can be inscribed in a semicircle of radius 3.5 cm?

(A) $7\frac{1}{4}$

(B) $9\frac{1}{4}$

(C) $12\frac{1}{4}$

(D) $15\frac{1}{4}$

52. $\frac{x^2 - bx}{ax - c} = \frac{m-1}{m+1}$ ସମୀକରଣର ମୂଳଦ୍ୱୟର ପରମମାନ ସମାନ, ମାତ୍ର ମୂଳ ଦ୍ୱୟ ବିପରୀତ ଚିହ୍ନ ବିଶିଷ୍ଟ । ତେବେ m ର ମାନ କେତେ?

(A) $\frac{a+b}{a-b}$

(B) $\frac{a-b}{a+b}$

(C) $\frac{2a+b}{a-b}$

(D) $\frac{2a-b}{a+b}$

53. 3.5 ସେ.ମି. ବ୍ୟାସାର୍ଦ୍ଧ ବିଶିଷ୍ଟ ଅର୍ଦ୍ଧବୃତ୍ତରେ ଅନ୍ତର୍ଲିଖିତ ବୃହତ୍ତମ ତ୍ରିଭୁଜର କ୍ଷେତ୍ରଫଳ କେତେ ବର୍ଗ ସେ.ମି. ?

(A) $7\frac{1}{4}$

(B) $9\frac{1}{4}$

(C) $12\frac{1}{4}$

(D) $15\frac{1}{4}$

(Space For Rough Work)

56. For what value of 'k',

$$x^3 - 5x^2 + kx - 2$$

has $x - 2$ as a factor of it ?

(A) 4

(B) 7

(C) -4

(D) -7

57. If $4x^3 - bx^2 + x - c$ leaves remainders 0 and 30 when divided by $x + 1$ and $2x - 3$ respectively, what is the value of $c - b$?

(A) 11

(B) 9

(C) -11

(D) -9

56. k ର କେଉଁ ମାନ ପାଇଁ

$$x^3 - 5x^2 + kx - 2$$

$x - 2$ ର ଏକ ଉତ୍ପାଦକ ହେବ ?

(A) 4

(B) 7

(C) -4

(D) -7

57. ଯଦି $4x^3 - bx^2 + x - c$ କୁ $x + 1$ ଓ $2x - 3$ ଦ୍ୱାରା ଭାଗ କଲେ, ଭାଗଶେଷ ଯଥାକ୍ରମେ 0 ଓ 30 ରହେ, ତେବେ $c - b$ ର ମାନ କେତେ ?

(A) 11

(B) 9

(C) -11

(D) -9

(Space For Rough Work)

60. A bag contains one-rupee coins, 50 paise coins and 20 paise coins and their numbers are in the ratio 3 : 5 : 8. If the total money in the bag is 142 rupees, what is the total number of coins in the bag ?

- (A) 240
- (B) 260
- (C) 300
- (D) 320

61. If $\frac{m+n}{m+3n} = \frac{2}{3}$, what is the value of $\frac{2n^2}{3m^2+mn}$?

- (A) $\frac{1}{7}$
- (B) $\frac{1}{9}$
- (C) $\frac{1}{12}$
- (D) $\frac{1}{15}$

60. ଗୋଟିଏ ଥଳିରେ ଏକଟଙ୍କା ମୁଦ୍ରା, 50 ପଇସା ମୁଦ୍ରା ଓ 20 ପଇସା ମୁଦ୍ରାର ସଂଖ୍ୟାର ଅନୁପାତ 3 : 5 : 8 । ଥଳିରେ ଯଦି ମୋଟ 142 ଟଙ୍କା ମୂଲ୍ୟର ମୁଦ୍ରା ଥାଏ, ତେବେ ମୁଦ୍ରାଗୁଡ଼ିକର ମୋଟ ସଂଖ୍ୟା କେତେ ?

- (A) 240
- (B) 260
- (C) 300
- (D) 320

61. $\frac{m+n}{m+3n} = \frac{2}{3}$ ହେଲେ, $\frac{2n^2}{3m^2+mn}$ ର ମାନ କେତେ ?

- (A) $\frac{1}{7}$
- (B) $\frac{1}{9}$
- (C) $\frac{1}{12}$
- (D) $\frac{1}{15}$

(Space For Rough Work)

64. A car travels 120 km from A to B with a speed of 30 km/hr and returns back with a speed of 40 km/hr. What is the average speed of the car in km/hr ?

(A) 35

(B) $35\frac{2}{7}$

(C) 34

(D) $34\frac{2}{7}$

65. What is the value of x in binary form if $(x)_2 \div (1001)_2 = (101)_2$?

(A) $(111001)_2$

(B) $(110101)_2$

(C) $(100111)_2$

(D) $(101101)_2$

64. ଗୋଟିଏ କାର୍ A ରୁ B ପର୍ଯ୍ୟନ୍ତ 120 କି.ମି. ଦୂରତାରୁ ଘଣ୍ଟାପ୍ରତି 30 କି.ମି. ବେଗରେ ଯାଇ ପୁଣି B ରୁ A ପର୍ଯ୍ୟନ୍ତ ଘଣ୍ଟାପ୍ରତି 40 କି.ମି. ବେଗରେ ଫେରି ଆସିଲା । ତେବେ କାର୍ଟିର ଉତ୍ତମ ଯାତ୍ରାର ହାରାହାରି ଘଣ୍ଟାପ୍ରତି ବେଗ କେତେ କି.ମି. ?

(A) 35

(B) $35\frac{2}{7}$

(C) 34

(D) $34\frac{2}{7}$

65. $(x)_2 \div (1001)_2 = (101)_2$ ହେଲେ, x ର ମାନ ଦ୍ଵିକରୁପରେ କେତେ ?

(A) $(111001)_2$

(B) $(110101)_2$

(C) $(100111)_2$

(D) $(101101)_2$

(Space For Rough Work)

68. What is the binary equivalence of the 10-base number 43 ?

- (A) 101011
- (B) 101101
- (C) 110011
- (D) 110101

68. ଦଶ-ଆଧାର ଭିତ୍ତିକ ସଂଖ୍ୟା 43ର ଦ୍ୱିକ ପଦ୍ଧତିରେ ମାନ କେତେ ?

- (A) 101011
- (B) 101101
- (C) 110011
- (D) 110101

69. The circumference of the base of a right circular cylinder is increased by 10 % and the height is decreased by 20 %. What is the percentage decrease caused in its volume ?

- (A) 0.032
- (B) 0.32
- (C) 3.2
- (D) 32

69. ଏକ ସରଳ ବୃତ୍ତ ଭୂମିକ ସିଲିଣ୍ଡରର ଭୂମିକ ପରିଧିକୁ 10 % ବୃଦ୍ଧି କଲେ ଏବଂ ଉଚ୍ଚତାକୁ 20 % କମାଇ ହେଲେ, ଏହାର ଆୟତନ ଶତକଡ଼ା କେତେ ହ୍ରାସ ପାଇବ ?

- (A) 0.032
- (B) 0.32
- (C) 3.2
- (D) 32

(Space For Rough Work)

72. What is the smallest value of the polynomial

$$4x^2 + 6x - 3 ?$$

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

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

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

(D) $-3\frac{1}{2}$

73. For which of the following values of 'p', $4 + px + 2x^2 + x^3$ leaves a remainder '2p' when divided by $2x + 1$?

(A) $2\frac{3}{8}$

(B) $1\frac{3}{8}$

(C) $2\frac{3}{4}$

(D) $1\frac{3}{4}$

72. $4x^2 + 6x - 3$ ପଲିନୋମିଆଲର ସ୍ୱତ୍ୱତମ ମାନ କେତେ ?

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

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

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

(D) $-3\frac{1}{2}$

73. p ର ନିମ୍ନ କେଉଁ ମାନ ପାଇଁ $4 + px + 2x^2 + x^3$ କୁ $2x + 1$ ଦ୍ୱାରା ଭାଗକଲେ, $2p$ ଭାଗଶେଷ ରହିବ ?

(A) $2\frac{3}{8}$

(B) $1\frac{3}{8}$

(C) $2\frac{3}{4}$

(D) $1\frac{3}{4}$

(Space For Rough Work)

PART-III

(PHYSICS)

76. (a) During conduction of heat, the particles of the conductor only transfer energy to the neighbouring particles without changing their positions.

(b) Electrical resistance of a cylindrical conductor is inversely proportional to the square of its radius.

(c) Rise of temperature in a metallic conductor decreases its electrical conductivity.

(A) (b) and (c) are correct, (a) is wrong

(B) (a) and (b) are wrong, (c) is correct

(C) (b) is wrong, (a) and (c) are correct

(D) (a), (b) and (c) are correct

76. (a) କୌଣସି ପୁଞ୍ଜରୀକାହୀ ମଧ୍ୟରେ ତାପ ସଂଚରଣ ବେଳେ ତାହାର କଣିକାଗୁଡ଼ିକ ସ୍ଥାନାନ୍ତରିତ ନହୋଇ କେବଳ ଶକ୍ତିକୁ ପଡ଼ୋଶୀ କଣିକା ମାନଙ୍କୁ ପ୍ରଦାନ କରିଥାଆନ୍ତି ।

(b) ଏକ ସିଲିଣ୍ଡର ଆକୃତିବିଶିଷ୍ଟ ବିଦ୍ୟୁତ୍ ପରିବାହୀର ପ୍ରତିରୋଧ ତାହାର ବ୍ୟାସାର୍ଦ୍ଧର ବର୍ଗର ପ୍ରତିଲୋମାନୁପାତି ଅଟେ ।

(c) ତାପମାତ୍ରା ବୃଦ୍ଧି ହେଲେ ଧାତବ ପରିବାହୀର ବିଦ୍ୟୁତ୍ ପରିବହନ କ୍ଷମତା ହ୍ରାସ ହୋଇଥାଏ ।

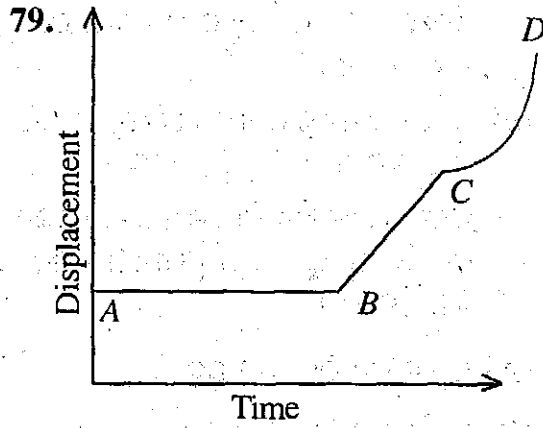
(A) (b) ଓ (c) ଠିକ୍, (a) ଭୁଲ୍

(B) (a) ଓ (b) ଭୁଲ୍, (c) ଠିକ୍

(C) (b) ଭୁଲ୍, (a) ଓ (c) ଠିକ୍

(D) (a), (b) ଓ (c) ଠିକ୍

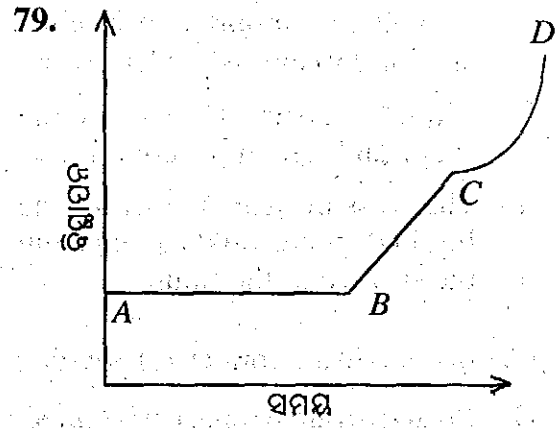
(Space For Rough Work)



In the given graph

- (a) BC , represents uniform velocity.
- (b) AB , represents non-uniform velocity.
- (c) CD , represents uniform acceleration.

- (A) (a) is correct, (b) and (c) are wrong
- (B) (a) and (b) are correct, (c) is wrong
- (C) (a) and (c) are wrong, (b) is correct
- (D) (b) is wrong, (a) and (c) are correct



ଦତ୍ତ ରେଖାଚିତ୍ରରେ

- (a) BC -ସମପରିବେଗକୁ ସୂଚାଉଛି ।
- (b) AB -ଅସମ ପରିବେଗକୁ ସୂଚାଉଛି ।
- (c) CD -ସମତ୍ୱରଣକୁ ସୂଚାଉଛି ।

- (A) (a) ଠିକ୍, (b) ଓ (c) ଭୁଲ୍
- (B) (a) ଓ (b) ଠିକ୍, (c) ଭୁଲ୍
- (C) (a) ଓ (c) ଭୁଲ୍, (b) ଠିକ୍
- (D) (b) ଭୁଲ୍, (a) ଓ (c) ଠିକ୍

(Space For Rough Work)

DET/PHY (3)

81.(a) Always velocity = $\frac{\text{Distance}}{\text{Time}}$

(b) Always acceleration

= $\frac{\text{Uniform velocity}}{\text{Time}}$

(c) Always retardation = change of $\frac{\text{Velocity}}{\text{Time}}$

- (A) (a) and (b) are correct (c) is wrong
(B) (c) is correct, (a) and (b) are wrong
(C) (a) and (c) are correct, (b) is wrong
(D) (b) and (c) are wrong, (a) is correct

81.(a) ସର୍ବଦା ପରିବେଗ = $\frac{\text{ଦୂରତ୍ଵ}}{\text{ସମୟ}}$

(b) ସର୍ବଦା ତ୍ଵରଣ = $\frac{\text{ସମ ପରିବେଗ}}{\text{ସମୟ}}$

(c) ସର୍ବଦା ମନ୍ଦନ = $\frac{\text{ପରିବେଗର ପରିବର୍ତ୍ତନ}}{\text{ସମୟ}}$

- (A) (a) ଓ (b) ଠିକ୍, (c) ଭୁଲ୍
(B) (c) ଠିକ୍, (a) ଓ (b) ଭୁଲ୍
(C) (a) ଓ (c) ଠିକ୍, (b) ଭୁଲ୍
(D) (b) ଓ (c) ଭୁଲ୍, (a) ଠିକ୍

(Space For Rough Work)

84. (a) Radiation of heat does not need a medium always
(b) The temperature range of a clinical thermometer is 95°C to 110°C
(c) The normal temperature of a healthy human body is usually 37°C .
- (A) (a) and (b) are correct, (c) is wrong
(B) (b) is wrong, (a) and (c) are correct
(C) (a) and (c) are wrong, (b) is correct
(D) (a), (b) and (c) are wrong

85. What quantity of heat is required to convert 10 ml of pure water at 0°C to steam at 100°C under normal-pressure?
- (A) 1000 calories
(B) 6400 calories
(C) 10,000 calories
(D) 26,880 calories

84. (a) ତାପ ବିକିରଣ ପାଇଁ ସର୍ବଦା ମାଧ୍ୟମର ଆବଶ୍ୟକ ହୁଏ ନାହିଁ ।
(b) ଏକ ଡାକ୍ତରୀ ଅରମୋମିଟରର ତାପମାତ୍ରା ସୀମା 95°C ରୁ 110°C ମଧ୍ୟରେ ଥାଏ ।
(c) ସୁସ୍ଥ ମାନବ ଶରୀରର ସାଧାରଣ ତାପମାତ୍ରା ସାଧାରଣତଃ 37°C ଅଟେ ।
- (A) (a) ଓ (b) ଠିକ୍, (c) ଭୁଲ୍
(B) (b) ଭୁଲ୍, (a) ଓ (c) ଠିକ୍
(C) (a) ଓ (c) ଭୁଲ୍, (b) ଠିକ୍
(D) (a), (b) ଓ (c) ଭୁଲ୍

85. 0°C ରେ ଥିବା 10 ମିଲିଲିଟର ବିଶୁଦ୍ଧ ଜଳକୁ 100°C ତାପମାତ୍ରା ବିଶିଷ୍ଟ ବାମ୍ଫରେ (ମାନକ ତାପରେ ବା ନରମାଳ ପ୍ରେସରରେ) ପରିବର୍ତ୍ତନ କରିବା ପାଇଁ କେତେ ତାପ ଆବଶ୍ୟକ ?
- (A) 1000 କେଲୋରି
(B) 6400 କେଲୋରି
(C) 10,000 କେଲୋରି
(D) 26,880 କେଲୋରି

(Space For Rough Work)

87. (a) We come to know about the direction of electromagnetic field created around a current carrying conductor by the right-hand thumb rule.

(b) We come to know about the direction of motion of a current carrying conductor in a magnetic field by Fleming's right-hand rule.

(c) When current passes through a circular conductor, the direction of the magnetic field is along the tangent to the circular conductor.

(d) The filament of electric bulb is made of tungsten metal.

(A) (a), (b) and (d) are correct, (c) is wrong

(B) (a) and (c) are correct, (b) and (d) are wrong

(C) (b) is wrong, (a), (c) and (d) are correct

(D) (b) and (c) are wrong, (a) and (d) are correct

87. (a) ଏକ ବିଦ୍ୟୁତ୍ ପ୍ରବାହୀ ତାରର ଚାରିପଟେ ଯେଉଁ ବିଦ୍ୟୁତ୍-ଚୁମ୍ବକୀୟ କ୍ଷେତ୍ର ସୃଷ୍ଟି ହୁଏ, ତାହାର ଦିଗ ଦକ୍ଷିଣ-ହସ୍ତ ବୃତ୍ତାଙ୍କୁଳି ନିୟମ ଦ୍ୱାରା ଜାଣିହୁଏ ।

(b) ଗୋଟିଏ ବିଦ୍ୟୁତ୍ ପ୍ରବାହୀ ତାରକୁ ଚୁମ୍ବକୀୟ କ୍ଷେତ୍ରରେ ରଖିଲେ ତାହା କେଉଁ ଦିଗକୁ ଗତି କରିବ, ତାହା ଫ୍ଲେମିଂଙ୍କର ଦକ୍ଷିଣ-ହସ୍ତ ନିୟମ ଦ୍ୱାରା ଜାଣିହୁଏ ।

(c) ଯେତେବେଳେ ଏକ ବୃତ୍ତାକାର ପରିବାହୀ ମଧ୍ୟରେ ବିଦ୍ୟୁତ୍ ପ୍ରବାହିତ ହୁଏ, ସୃଷ୍ଟି ଚୁମ୍ବକୀୟ କ୍ଷେତ୍ରର ଦିଗ ବୃତ୍ତାକାର ପରିବାହୀର ସ୍ପର୍ଶକ ଦିଗରେ ଥାଏ ।

(d) ଇଲେକ୍ଟ୍ରିକ୍ ବଲ୍‌ବ୍ରେ ବ୍ୟବହୃତ ଫିଲାମେଣ୍ଟ ଟଙ୍ଗଷ୍ଟେନ୍ ଧାତୁରେ ତିଆରି ହୋଇଥାଏ ।

(A) (a), (b) ଓ (d) ଠିକ୍, (c) ଭୁଲ୍

(B) (a) ଓ (c) ଠିକ୍, (b) ଓ (d) ଭୁଲ୍

(C) (b) ଭୁଲ୍, (a), (c) ଓ (d) ଠିକ୍

(D) (b) ଓ (c) ଭୁଲ୍, (a) ଓ (d) ଠିକ୍

(Space For Rough Work)

89. If the radius of the lunar orbit is 'x' units, then in 15 days the angular and linear displacement of moon would be respectively,

(a) 90° , πx

(b) 180° , $2\pi x$

(c) 180° , $2x$

(A) (a) and (b) are wrong, (c) is correct

(B) (b) and (c) are wrong, (a) is correct

(C) (b) is correct, (a) and (c) are wrong

(D) (a), (b) and (c) are wrong

89. ଯଦି ଚନ୍ଦ୍ର କକ୍ଷର ବ୍ୟାସାର୍ଦ୍ଧ 'x' ଏକକ ହୁଏ, ତେବେ 15 ଦିନରେ ଚନ୍ଦ୍ରର କୌଣସି ବିସ୍ଥାପନ ଓ ରୈଖିକ ବିସ୍ଥାପନ ଯଥାକ୍ରମେ ହେବ,

(a) 90° , πx

(b) 180° , $2\pi x$

(c) 180° , $2x$

(A) (a) ଓ (b) ଭୁଲ, (c) ଠିକ୍

(B) (b) ଓ (c) ଭୁଲ, (a) ଠିକ୍

(C) (b) ଠିକ୍, (a) ଓ (c) ଭୁଲ

(D) (a), (b) ଓ (c) ଭୁଲ

(Space For Rough Work)

92. Force is

- (a) a vector quantity
 - (b) the product of mass and acceleration
 - (c) Energy spent per unit mass
- (A) (a) and (c) are wrong, (b) is correct
- (B) (c) is correct, (a) and (b) are wrong
- (C) (a) and (b) are correct, (c) is wrong
- (D) (a), (b) and (c) are correct

93.(a) When 20 N force is applied on a body of mass 8 kg, the acceleration produced is 2.5 m/s^2

- (b) Gravitation is an isolated force
- (c) The energy required in lifting a body of 5 kg mass to a height of 2 m is 100 J

$$(g = 10 \text{ m/s}^2)$$

- (A) (a) and (c) are correct, (b) is wrong
- (B) (b) and (c) are wrong, (a) is correct
- (C) (b) is correct, (a) and (c) are wrong
- (D) (c) is wrong, (a) and (b) is correct

92. ବଳ ହେଉଛି,

- (a) ଏକ ସଦିଶ ରାଶି
- (b) ବସ୍ତୁ ଓ ତ୍ୱରଣର ଗୁଣଫଳ
- (c) ପ୍ରତି ଏକକ ବସ୍ତୁ ପାଇଁ ବ୍ୟୟିତ ଶକ୍ତି

(A) (a) ଓ (c) ଭୁଲ୍ (b) ଠିକ୍

(B) (c) ଠିକ୍, (a) ଓ (b) ଭୁଲ୍

(C) (a) ଓ (b) ଠିକ୍ (c) ଭୁଲ୍

(D) (a), (b) ଓ (c) ଠିକ୍

93.(a) 8 kg (କିଲୋଗ୍ରାମ) ବସ୍ତୁ ବିଶିଷ୍ଟ ଏକ ବସ୍ତୁ ଉପରେ 20 ନିଉଟନ୍ ବଳ ପ୍ରୟୋଗ କଲେ, ତ୍ୱରଣ $2.5 \text{ ମିଟର/ବର୍ଗସେକେଣ୍ଡ}$ ହେବ ।

- (b) ମହାକର୍ଷଣ ଏକ ଏକାକୀ ବଳ ଅଟେ ।
- (c) 5 କିଲୋଗ୍ରାମ ବସ୍ତୁ ବିଶିଷ୍ଟ ବସ୍ତୁକୁ 2 ମିଟର ଉଚ୍ଚକୁ ଉଠାଇବା ପାଇଁ 100 J ଶକ୍ତି ଆବଶ୍ୟକ ।

$$(g = 10 \text{ ମିଟର/ବର୍ଗସେକେଣ୍ଡ})$$

(A) (a) ଓ (c) ଠିକ୍, (b) ଭୁଲ୍

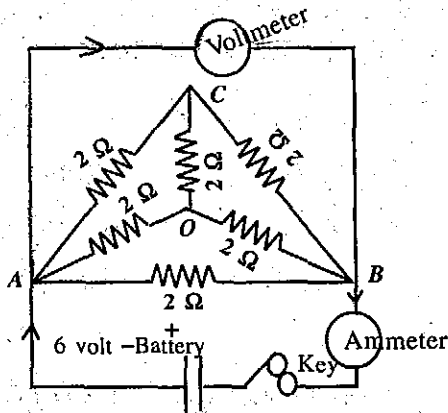
(B) (b) ଓ (c) ଭୁଲ୍, (a) ଠିକ୍

(C) (b) ଠିକ୍, (a) ଓ (c) ଭୁଲ୍

(D) (c) ଭୁଲ୍, (a) ଓ (b) ଠିକ୍

(Space For Rough Work)

96.

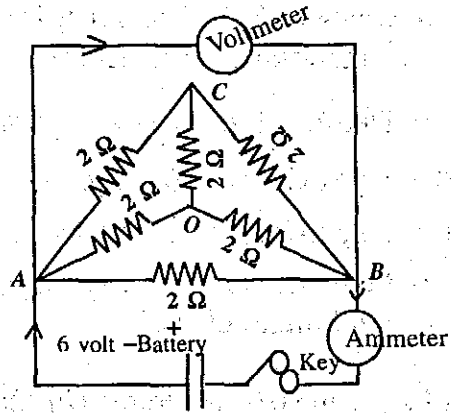


In the given circuit diagram, on closing the key.

- (a) The reading of the ammeter would be 6 Ampere.
- (b) The reading of the voltmeter would be 6 volt.
- (c) Effective Resistance across A and B would be 2 ohm.
- (d) Effective Resistance across B and A would be 1 ohm.

- (A) (a), (b) and (c) are correct, (d) is wrong
- (B) (b) and (c) are correct, (a) and (d) are wrong
- (C) (a), (b) and (d) are correct, (c) is wrong
- (D) (b), (c) and (d) are wrong, (a) is correct

96.



ଦତ୍ତ ପରିପଥ ଚିତ୍ର ଅନୁସାରେ ସ୍ୱିଚ୍(key)କୁ ବନ୍ଦ କଲେ

- (a) ଏମିଟର ପାଠ୍ୟାଙ୍କ 6 ଆମ୍ପିୟର ହେବ ।
- (b) ଭୋଲ୍ଟମିଟର ପାଠ୍ୟାଙ୍କ 6 ଭୋଲ୍ଟ ହେବ ।
- (c) A ଓ B ମଧ୍ୟରେ ସମୁଦ୍ର ପ୍ରତିରୋଧ 2 ଓମ୍ ହେବ ।
- (d) B ଓ A ମଧ୍ୟରେ ସମୁଦ୍ର ପ୍ରତିରୋଧ 1 ଓମ୍ ହେବ ।

- (A) (a), (b) ଓ (c) ଠିକ୍, (d) ଭୁଲ୍
- (B) (b) ଓ (c) ଠିକ୍, (a) ଓ (d) ଭୁଲ୍
- (C) (a), (b) ଓ (d) ଠିକ୍, (c) ଭୁଲ୍
- (D) (b), (c) ଓ (d) ଭୁଲ୍, (a) ଠିକ୍

(Space For Rough Work)

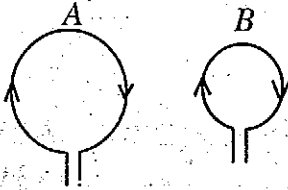
99. When a resistance wire is connected to a battery of 12 volt, the ammeter reads 4 Amperes. Then the resistance of the wire would be

- (A) 3 ohm
- (B) 8 ohm
- (C) 16 ohm
- (D) 48 ohm

99. ଏକ ପ୍ରତିରୋଧ ତାରକୁ 12 ଭୋଲ୍ଟ ବିଶିଷ୍ଟ ଏକ ବ୍ୟାଟେରୀ ସହ ସଂଯୋଗ କରିବାରୁ ପରିପଥରେ ଥିବା ଆମିଟର ପାଠ୍ୟାଙ୍କ 4 ଆମ୍ପିୟର ହେଲା । ତେବେ ତାରର ପ୍ରତିରୋଧ ହେବ

- (A) 3 ଓମ୍
- (B) 8 ଓମ୍
- (C) 16 ଓମ୍
- (D) 48 ଓମ୍

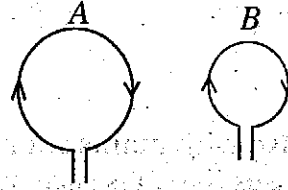
100.



A and B are two circular conductors of the same material and thickness carry the same amount of current. The number of turns in 'B' is twice that of A, but radius of 'B' is half of that of A. The ratio of the strength of the magnetic field at the center of 'B' and that of 'A' is

- (A) 4 : 1
- (B) 1 : 4
- (C) 1 : 2
- (D) 2 : 1

100.



A ଓ B ଦୁଇଟି ବୃତ୍ତାକାର ପରିବାହୀ । ଉଭୟ ଏକା ଉପାଦାନ ଓ ମୋଟେଇ ବିଶିଷ୍ଟ ଏବଂ ସମାନ ପରିମାଣର ବିଦ୍ୟୁତ୍ ଉଦ୍ଭୟ ତାରରେ ପ୍ରବାହିତ ହେଉଛି । 'B' ରେ 'A' ର ଦୁଇ ଗୁଣ ତାର ଘେରା ଅଛି, ମାତ୍ର 'B' ର ବ୍ୟାସାର୍ଦ୍ଧ 'A' ର ବ୍ୟାସାର୍ଦ୍ଧର ଅଧା ଅଟେ । 'B' ର କେନ୍ଦ୍ରରେ ସୃଷ୍ଟ ରୁମ୍ଭକାୟ କ୍ଷେତ୍ରର ସାମର୍ଥ୍ୟ ଏବଂ 'A' ର କେନ୍ଦ୍ରରେ ସୃଷ୍ଟ ରୁମ୍ଭକାୟ କ୍ଷେତ୍ରର ସାମର୍ଥ୍ୟର ଅନୁପାତ ହେବ,

- (A) 4 : 1
- (B) 1 : 4
- (C) 1 : 2
- (D) 2 : 1

(Space For Rough Work)

PART—I
PHYSICS

1. The SI unit of Gravitational constant G is
 - (A) Nm kg^{-1}
 - (B) $\text{Nm}^2 \text{kg}^{-1}$
 - (C) Nm kg^{-2}
 - (D) $\text{Nm}^2 \text{kg}^{-2}$
2. If a car at rest accelerates uniformly to a speed of 144 km/hour in 20 sec., it covers a distance of,
 - (A) 20 m
 - (B) 400 m
 - (C) 1440 m
 - (D) 2980 m
3. What is the dot product of two vectors of magnitude 3 and 5, if the angle between them is 60° ?
 - (A) 9.5
 - (B) 8.4
 - (C) 7.5
 - (D) 5.2
4. A javeline is thrown at an angle θ with the horizontal and the range is maximum. The value of $\tan \theta$ is
 - (A) 1
 - (B) $\sqrt{3}$
 - (C) $\frac{1}{\sqrt{3}}$
 - (D) 2

(Space For Rough Work)

7. Choose the false statement :

The acceleration due to gravity (g) decreases if,

- (A) We go down from the surface of earth towards its centre.
- (B) We go up from the surface of the earth.
- (C) We go from equator towards the poles on the surface of the earth.
- (D) The rotational velocity of the earth is increased.

9. A metallic bar is heated from 0°C to 100°C . The coefficient of linear expansion is $10^{-5}/^\circ\text{K}$. What will be the percentage increase in length ?

- (A) 0.01%
- (B) 0.1%
- (C) 1%
- (D) 10%

8. If M_e and R_e be the mass and radius of earth, then the value of escape velocity is

- (A) $\sqrt{\frac{GM_e}{R_e}}$
- (B) $\sqrt{2\frac{GM_e}{R_e}}$
- (C) $\sqrt{GM_e R_e}$
- (D) $\sqrt{2 GM_e R_e}$

10. Which of the following causes more severe burns ?

- (A) Boiling water
- (B) Steam
- (C) Hot air
- (D) Sun rays

(Space For Rough Work)

15. Optical fibres are based on

- (A) Total internal reflection
- (B) Less scattering
- (C) Refraction
- (D) Reflection

16. Two thin lenses are in contact and the focal length of the combination is 80 cm. If the focal length of one of the lenses is 20 cm, the power of the other lens is

- (A) 1.66 D
- (B) 4.00 D
- (C) -1.00 D
- (D) -3.75 D

17. The capacitance of a parallel plate capacitor does not depend upon

- (A) Area of the plate
- (B) Medium between the plates
- (C) Distance between the plates
- (D) Metal of the plates

18. The resistivity of a wire depends on its

- (A) Length
- (B) Area of cross-section
- (C) Shape
- (D) Material

(Space For Rough Work)

23. Control rods used in nuclear reactors are made of

- (A) Stainless steel
- (B) Graphite
- (C) Cadmium
- (D) Plutonium

24. γ -rays passing through a strong uniform electric field get deflected :

- (A) in the direction of electric field
- (B) in the direction opposite to the electric field
- (C) in the direction perpendicular to the electric field
- (D) do not get deflected at all.

25. An atomic nucleus contains neutrons and protons. The sum of masses of the neutrons and protons in free space is

- (A) equal to the mass of nucleus
- (B) less than the mass of nucleus
- (C) greater than the mass of nucleus
- (D) sometimes less and sometimes more.

(Space For Rough Work)

28. Which configuration is impossible ?

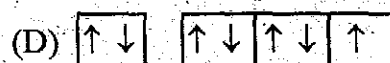
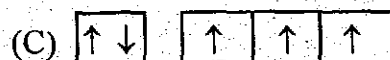
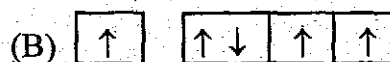
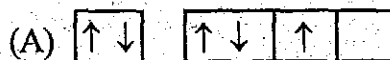
(A) $3s^2$

(B) $3p^5$

(C) $2d^5$

(D) $4f^3$

29. The orbital diagram in which Aufbau's principle is violated is



30. M-shell can accommodate maximum

(A) 02 nos. of electrons

(B) 08 nos. of electrons

(C) 18 nos. of electrons

(D) 32 nos. of electrons

31. Which of the following molecule is in linear shape ?

(A) H_2O

(B) H_2O_2

(C) CH_4

(D) CO_2

(Space For Rough Work)

38. Limestone is a mineral of

- (A) Magnesium
- (B) Calcium
- (C) Sodium
- (D) Potassium

40. Cartridges are made from

- (A) Bronze
- (B) Brass
- (C) Bell metal
- (D) Nickel

42. $\text{H}_2\text{C} = \text{CH} -$ group is known as

- (A) Vinyl
- (B) Propyl
- (C) Methyl
- (D) Ethyl

39. During extraction of metal which of the following method produces slag ?

- (A) Concentration
- (B) Calcination
- (C) Roasting
- (D) Smelting

41. In alkanes, carbon atoms are linked by

- (A) single covalent bond
- (B) double covalent bond
- (C) triple covalent bond
- (D) single ionic bond

43. In Ion-exchange method, the exhausted cation exchange resin will be regenerated by the treatment with

- (A) moderately concentrated acetic acid
- (B) moderately concentrated oxalic acid
- (C) moderately concentrated phosphoric acid
- (D) moderately concentrated sulphuric acid

(Space For Rough Work)

48. Combination of identical monomers form

- (A) copolymer
- (B) homopolymer
- (C) heteropolymer
- (D) polymer

49. Man is the receptor of CO gas which causes

- (A) Blindness
- (B) Cardiac arrest
- (C) Arthritis
- (D) Meningitis

50. Which of the following gas in atmosphere absorbs IR radiation ?

- (A) Oxygen
- (B) Hydrogen
- (C) Nitrogen
- (D) Carbon dioxide

(Space For Rough Work)

55. The middle term in the expansion of

$$\left(x + \frac{1}{x}\right)^{10} \text{ is}$$

(A) ${}^{10}C_1 \frac{1}{x}$

(B) ${}^{10}C_5$

(C) ${}^{10}C_6$

(D) ${}^{10}C_7 x$

57. Find the values of x and y if

$$(1-i)x + (1+i)y = 1-3i$$

(A) $x = -1, y = 2$

(B) $x = 2, y = -1$

(C) $x = 2, y = 2$

(D) $x = 1, y = -1$

56. The no. of terms in the expansion of

$$\sqrt{(3x^2 + 2y^2)^{16}} \text{ is}$$

(A) 9

(B) 17

(C) 10

(D) 16

58. If $1, \omega, \omega^2$ are imaginary cube-roots of unity, then the value of

$$(1-\omega+\omega^2)^7 + (1+\omega-\omega^2)^7 \text{ is}$$

(A) -128

(B) 218

(C) 128

(D) None of these.

(Space For Rough Work)

63. The radius of the circle

$$x^2 + y^2 - 2x + 4y + 1 = 0 \text{ is}$$

- (A) 1
- (B) 4
- (C) 2
- (D) $\sqrt{19}$

65. The projection of the line segment
(1, 3, -1) and (3, 2, 4) on Z-axis is

- (A) 1
- (B) 3
- (C) 4
- (D) 5

64. The equation of the circle which passes
through the points (0, 1), (1, 0) and
(2, 1) is

- (A) $x^2 + y^2 - 2x - 2y + 1 = 0$
- (B) $x^2 - y^2 + 2x - 2y - 1 = 0$
- (C) $x^2 + y^2 + 2x + 2y - 1 = 0$
- (D) None of these.

66. If a line makes angles α , β , γ with
X, Y and Z-axis respectively, then the
value of $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma$ is

- (A) 1
- (B) 2
- (C) 0
- (D) None of these.

(Space For Rough Work)

71. The value of $\frac{\cos 15^\circ - \sin 15^\circ}{\cos 15^\circ + \sin 15^\circ}$ is

- (A) $\frac{1}{\sqrt{2}}$
 (B) $\sqrt{3}$
 (C) $\frac{1}{\sqrt{3}}$
 (D) $\frac{1}{2}$

73. The general solution of the equation $\tan ax = \tan bx$ is

- (A) $\frac{\pi \left(n + \frac{1}{2} \right)}{a+b}$
 (B) $\frac{n\pi}{a+b}$
 (C) $n\pi - (a+b)$
 (D) None of these.

72. The principal solution of the equation

$$\cos^2 \theta + \sin \theta + 1 = 0 \text{ is}$$

- (A) $\frac{2\pi}{3}$
 (B) $\frac{3\pi}{2}$
 (C) $\frac{5\pi}{2}$
 (D) $\frac{\pi}{3}$

74. In any triangle ABC , if $A : B : C = 1 : 2 : 3$ then $\sin A : \sin B : \sin C$ is

- (A) $2:1:\sqrt{3}$
 (B) $1:\sqrt{2}:3$
 (C) $1:\sqrt{3}:2$
 (D) $\sqrt{3}:1:2$

(Space For Rough Work)

79. For what value of k the function given

$$\text{by } f(x) = \begin{cases} kx^2, & \text{if } x > 2 \\ 3, & \text{if } x \leq 2 \end{cases} \text{ is continuous}$$

at $x = 2$

(A) 3

(B) $\frac{4}{3}$

(C) 4

(D) $\frac{3}{4}$

80. If $y = \sqrt{1 + \sin 2x}$, then $\frac{dy}{dx}$ is

(A) $\sin x - \cos x$

(B) $\sin x + \cos x$

(C) $\cos x - \sin x$

(D) None of these.

81. If $y = \tan^{-1} \left(\frac{1+x^2}{1-x^2} \right)$, then $\frac{dy}{dx}$ is

(A) $\frac{-1}{1+x^4}$

(B) $\frac{2x}{1+x^4}$

(C) $\frac{1}{1-x^4}$

(D) None of these.

82. If $y = x^x$, then $\frac{dy}{dx}$ is

(A) $(1 + \log x)$

(B) $\frac{1}{\log x - 1}$

(C) $x^x (1 + \log x)$

(D) None of these.

(Space For Rough Work)

87. $\int \frac{1}{1+e^{-x}} dx$ is equal to

- (A) $\ln(e^x + 1) + c$
- (B) $\ln(e^{-x} + 1) + c$
- (C) $\ln(e^x + e^{-x}) + c$
- (D) None of these.

88. If $\int x \sin x dx = -x \cos x + A$, then A is equal to

- (A) $\cos x + \text{constant}$
- (B) constant
- (C) $\sin x + \text{constant}$
- (D) None of these.

89. $\int e^x [f(x) + f'(x)] dx$ is equal to

- (A) $e^x f(x) + c$
- (B) $e^x f'(x) + c$
- (C) $e^x [f(x) + f'(x)] + c$
- (D) None of these.

90. $\int \frac{3x-1}{(x-1)(x+1)} dx$ is equal to

- (A) $\log[(x-1)(x+1)] + c$
- (B) $\frac{1}{x-1} + \frac{1}{x+1} + c$
- (C) $\frac{3}{x-1} + \frac{2}{x+1} + c$
- (D) None of these.

(Space For Rough Work)

95. The solution of the differential equation

$$\frac{dy}{dx} + \frac{\tan y}{\tan x} = 0 \text{ is}$$

- (A) $\tan y = \tan x + c$
- (B) $\tan y \cdot \tan x = c$
- (C) $\sin y \cdot \sin x = c$
- (D) None of these.

96. The differential equation

$$(ay^2 + x + x^8)dx + (y^8 - y + bxy)dy = 0$$

is said to be exact if

- (A) $b = a$
- (B) $b = 2a$
- (C) $a = 1, b = 3$
- (D) $b \neq 2a$

97. If \vec{a} and \vec{b} are two unit vectors inclined at an angle θ , such that $\vec{a} + \vec{b}$ is a unit vector, then θ is equal to

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

98. The value of $\hat{i} \times (\hat{j} \times \hat{k})$ is

- (A) $\vec{0}$
- (B) \hat{i}
- (C) \hat{j}
- (D) \hat{k}

(Space For Rough Work)

5. A weightlifter lifts a weight off the ground and holds it up.
- (A) Work is done in lifting as well as holding the weight.
- (B) No work is done in both lifting and holding the weight.
- (C) Work is done in lifting the weight, but no work is required to be done in holding it up.
- (D) No work is done in lifting the weight, but work is required to be done in holding it up.
6. The momentum of a body is numerically equal to its kinetic energy. The velocity of the particle will be,
- (A) 1 m/sec
- (B) 4 m/sec
- (C) 8 m/sec
- (D) 2 m/sec

(Space For Rough Work)

11. A metallic rod is continuously heated at its two ends. The flow of heat through the rod does not depend upon

- (A) The area of cross-section of the rod
- (B) The mass of the rod
- (C) Time of heating
- (D) Temperature difference

13. Which of the following statement is correct ?

- (A) Both sound and light waves in air are longitudinal.
- (B) Both sound and light waves in air are transverse.
- (C) Sound waves in air are transverse while light waves are longitudinal.
- (D) Sound waves in air are longitudinal while light waves are transverse.

12. The time period of a simple pendulum is 2 sec. If its length is increased by 4 times, the time period becomes,

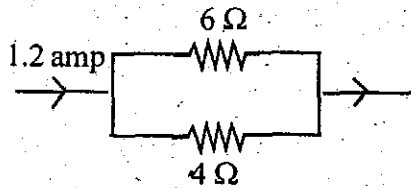
- (A) 4 sec
- (B) 6 sec
- (C) 8 sec
- (D) 2 sec

14. The refractive index of water with respect to air is $\frac{4}{3}$ and the refractive index of glass with respect to air is $\frac{3}{2}$. What will be the refractive index of water with respect to glass ?

- (A) $\frac{9}{8}$
- (B) $\frac{8}{9}$
- (C) $\frac{1}{2}$
- (D) 2

(Space For Rough Work)

19. In the figure given below, the current passing through $6\ \Omega$ resistor is



- (A) 0.4 amp
- (B) 0.48 amp
- (C) 0.72 amp
- (D) 0.8 amp

21. The magnetic field \vec{dB} due to a small current element \vec{dl} at a distance r and carrying current I is

(A) $\vec{dB} = \frac{\mu_0}{4\pi} I \left(\frac{\vec{dl} \times \vec{r}}{r} \right)$

(B) $\vec{dB} = \frac{\mu_0}{4\pi} I^2 \left(\frac{\vec{dl} \times \vec{r}}{r} \right)$

(C) $\vec{dB} = \frac{\mu_0}{4\pi} I^2 \left(\frac{\vec{dl} \times \vec{r}}{r^2} \right)$

(D) $\vec{dB} = \frac{\mu_0}{4\pi} I \left(\frac{\vec{dl} \times \vec{r}}{r^3} \right)$

20. How much electrical energy in kWh is consumed in operating ten number 50 watt bulbs for 10 hours per day in a month of 30 days.

- (A) 1500
- (B) 15000
- (C) 15
- (D) 150

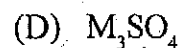
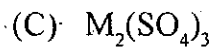
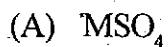
22. Lenz's law is a consequence of the law of conservation of

- (A) Charge
- (B) Mass
- (C) Momentum
- (D) Energy

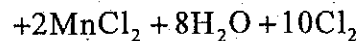
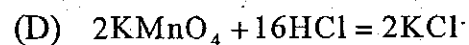
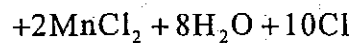
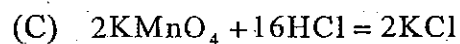
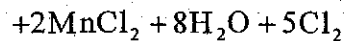
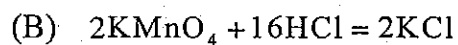
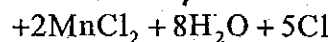
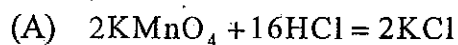
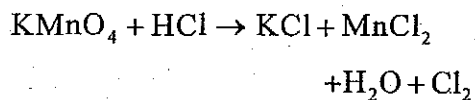
(Space For Rough Work)

PART—II
CHEMISTRY

26. The formula of a metal nitride is MN.
The formula of its sulphate is



27. Which one is the balanced form of the following chemical equation :



(Space For Rough Work)

32. Ammonia molecule can form

- (A) ionic bond
- (B) covalent bond
- (C) co-ordinate bond
- (D) metallic bond

34. What is the equivalent mass of potassium carbonate?

- (A) 49
- (B) 59
- (C) 69
- (D) 79

36. In electrolytic cell

- (A) Chemical energy is converted into electrical energy
- (B) Electrical energy is converted into chemical energy
- (C) Electrical energy is converted into light energy
- (D) Chemical energy is converted into light energy

33. Which of the following is a Lewis acid?

- (A) CaCl_2
- (B) NaCl
- (C) FeCl_3
- (D) SiCl_4

35. pH values of basic solution will be

- (A) greater than 7
- (B) less than 7
- (C) equal to 7
- (D) equal to 6

37. The quantity of electricity which produces one gram equivalent of substance in Faraday's second law of electrolysis is

- (A) Farad
- (B) Volt
- (C) Ampere
- (D) Ohm

(Space For Rough Work)

44. Temporary hardness is due to presence of

- (A) soluble bicarbonates of Calcium and Magnesium
- (B) soluble carbonates of Calcium and Magnesium
- (C) soluble chlorides of Calcium and Magnesium
- (D) soluble sulphates of Calcium and Magnesium

46. Molybdenum disulphide is stable in presence of air up to

- (A) 400 °C
- (B) 600 °C
- (C) 800 °C
- (D) 1000 °C

45. In making lead pencils, which of the following is used ?

- (A) Boron trifluoride
- (B) Boron Nitride
- (C) Molybdenum Disulphide
- (D) Graphite

47. Calorific value of a fuel is the amount of heat energy released by complete combustion of

- (A) 10 kg of fuel
- (B) 10 gm of fuel
- (C) 1 gm of fuel
- (D) 1 kg of fuel

(Space For Rough Work)

PART—III
MATHEMATICS

51. The value of the determinant

$$\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} \text{ is}$$

- (A) 0
(B) 1
(C) $a + b + c$
(D) $ab + bc + ca$

53. If $A = \begin{bmatrix} 1 & -2 \\ 5 & 3 \end{bmatrix}$, then $A + A^T$ equals

- (A) $\begin{bmatrix} 2 & 3 \\ 3 & 6 \end{bmatrix}$
(B) $\begin{bmatrix} 2 & -4 \\ 10 & 6 \end{bmatrix}$
(C) $\begin{bmatrix} 2 & 4 \\ -10 & 6 \end{bmatrix}$
(D) None of these.

52. If K is a scalar and A is a $n \times n$ square matrix, then $|KA|$ is equal to

- (A) $K|A|^n$
(B) $K|A|$
(C) $K^n|A^n|$
(D) $K^n|A|$

54. If $A = \begin{bmatrix} -5 & 2 \\ 1 & -3 \end{bmatrix}$, then $\text{adj. } A$ is equal to

- (A) $\begin{bmatrix} -3 & -2 \\ -1 & -5 \end{bmatrix}$
(B) $\begin{bmatrix} 3 & -2 \\ -1 & 5 \end{bmatrix}$
(C) $\begin{bmatrix} 5 & 1 \\ 2 & 3 \end{bmatrix}$
(D) $\begin{bmatrix} 3 & 2 \\ 1 & 5 \end{bmatrix}$

(Space For Rough Work)

59. Resolving into partial fraction if

$$\frac{3x+2}{(x-1)(x-2)(x-3)} = \frac{A}{x-1} + \frac{B}{x-2} + \frac{C}{x-3}$$

then the value of C is

- (A) $\frac{5}{2}$
- (B) $\frac{11}{2}$
- (C) $\frac{9}{2}$
- (D) None of these.

61. The distance between the parallel lines

$$3x - 4y + 9 = 0 \text{ and } 6x - 8y - 15 = 0 \text{ is}$$

- (A) $\frac{33}{10}$
- (B) $\frac{10}{33}$
- (C) $\frac{9}{15}$
- (D) $\frac{15}{9}$

60. The equation of a straight line which passes through the point $(0, 1)$ and has an inclination 45° with X -axis is

- (A) $x + y + 1 = 0$
- (B) $x - y - 1 = 0$
- (C) $y - x - 1 = 0$
- (D) None of these.

62. If p be the length of the perpendicular from the origin on the line whose intercepts on the co-ordinate axes are a and b , then it satisfies the equation is

- (A) $p = \sqrt{a^2 + b^2}$
- (B) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$
- (C) $p = \frac{1}{\sqrt{a^2 + b^2}}$
- (D) None of these.

(Space For Rough Work)

67. The angle between the lines whose direction ratios are (2, 3, 4) and (1, -2, 1) is

(A) $\frac{\pi}{2}$

(B) $\frac{\pi}{4}$

(C) $\frac{\pi}{3}$

(D) π

69. The equation of a plane perpendicular to Z-axis and passing through the point (1, -2, 4) is

(A) $x = 1$

(B) $y + 2 = 0$

(C) $z - 4 = 0$

(D) $x + y + z - 3 = 0$

68. If two planes $A_1x + B_1y + C_1z + D_1 = 0$ and $A_2x + B_2y + C_2z + D_2 = 0$ are parallel, then it satisfies the condition is

(A) $\frac{A_1}{A_2} \neq \frac{B_1}{B_2}$

(B) $\frac{A_1}{A_2} = \frac{B_1}{B_2} = \frac{C_1}{C_2}$

(C) $\frac{A_1}{A_2} = \frac{B_1}{B_2} \neq \frac{C_1}{C_2}$

(D) None of these.

70. If $\cos \theta = -\frac{1}{2}$ and $\pi < \theta < \frac{3\pi}{2}$, then the value of $4 \tan^2 \theta - 3 \operatorname{cosec}^2 \theta$ is

(A) 8

(B) -10

(C) -8

(D) 10

(Space For Rough Work)

75. In triangle ABC if

$$\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$$

then the triangle is

- (A) equilateral
- (B) isosceles
- (C) scalene
- (D) right angle

76. $\lim_{x \rightarrow \infty} \frac{5x-6}{\sqrt{4x^2+9}}$ is equal to

- (A) $\frac{5}{4}$
- (B) $\frac{5}{2}$
- (C) $\frac{5}{9}$
- (D) $-\frac{1}{2}$

77. The value of $\lim_{x \rightarrow 0} \left(1 + \frac{x}{2}\right)^{\frac{1}{x}}$ is

- (A) $e^{\frac{1}{2}}$
- (B) e^2
- (C) e
- (D) $\frac{1}{2}$

78. The value of $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$ is

- (A) $\frac{1}{4}$
- (B) $\frac{1}{2}$
- (C) 1
- (D) None of these.

(Space For Rough Work)

LA/MATH (1)

83. If $x^y = y^x$, then $\frac{dy}{dx}$ is

(A) $\frac{\ln y + \frac{y}{x}}{y^2}$

(B) $\frac{\ln y - \frac{y}{x}}{\ln x - \frac{x}{y}}$

(C) $\frac{1 + \frac{y}{x}}{1 - \frac{y}{x}}$

(D) None of these.

84. If $u = t^2$, and $v = \sin t^2$, then $\frac{dv}{du}$ is

(A) $\cos^2 t$

(B) $2t \cos t^2$

(C) $\frac{\cos^2 t}{2t}$

(D) $\cos t^2$

85. If $f(x) = x^3 - 6x^2 + 9x + 7$, then the local minimum value of $f(x)$ is

(A) 7

(B) 11

(C) 6

(D) -7

86. $\int \sin\left(a + \frac{x}{b}\right) dx$ is equal to

(A) $\cos\left(a + \frac{x}{b}\right) + c$

(B) $-b \cos\left(a + \frac{x}{b}\right) + c$

(C) $-b \sin\left(a + \frac{x}{b}\right) + c$

(D) $\frac{1}{b} \cos\left(a + \frac{x}{b}\right) + c$

(Space For Rough Work)

91. The value of the integral

$$\int_0^{\pi} |\cos x| dx \text{ is}$$

- (A) 1
- (B) 2
- (C) 0
- (D) -1

92. The area under the curve $y = 2\sqrt{x}$, included between the line $x = 0$, $x = 1$ and X-axis is

- (A) $\frac{1}{4}$ sq. units
- (B) $\frac{1}{2\sqrt{2}}$ sq. units
- (C) $\frac{3}{4}$ sq. units
- (D) $\frac{4}{3}$ sq. units

93. The order and degree of the differential

$$\text{equation } \left[1 + \left(\frac{dy}{dx} \right)^2 \right]^{\frac{3}{2}} = 5 \frac{d^2y}{dx^2} \text{ is}$$

- (A) order 2, degree-2
- (B) order 1, degree-3
- (C) order 2, degree-3
- (D) order 2, degree-1

94. The integrating factor of the linear differential equation

$$\frac{dy}{dx} + \frac{2xy}{1+x^2} = \frac{4x}{1+x^2} \text{ is}$$

- (A) $1+x^2$
- (B) $\frac{2x}{1+x^2}$
- (C) $4x$
- (D) None of these.

(Space For Rough Work)

99. If $z = \sin^{-1}\left(\frac{x}{y}\right)$, then $\frac{\partial z}{\partial y}$ is

(A) $\frac{1}{\sqrt{x^2 - y^2}}$

(B) $\frac{-x}{y\sqrt{y^2 - x^2}}$

(C) $\frac{y}{\sqrt{y^2 - x^2}}$

(D) $\frac{x}{\sqrt{y^2 - x^2}}$

100. If $v = x^3 + axy^2$, satisfies the equation

$$\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 0, \text{ then the value of } a \text{ is}$$

(A) 3

(B) 6

(C) -3

(D) -6

(Space For Rough Work)

ENGLISH, GENERAL KNOWLEDGE, GENERAL SCIENCE & BASIC MATHEMATICS

(For Admission to Non-Engineering Diploma Courses)

Candidate's Roll Number

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Application Number

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OMR Serial Number

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Undertaking :

I have carefully gone through the instructions given below and hereby agree to follow them.

 Full Signature of the Candidate

 Full Signature of the Invigilator

INSTRUCTIONS TO CANDIDATE

1. After receiving the question booklet, gently pull out the answer sheet without breaking the paper seal of the Question Booklet.
2. Check that the SET CODE printed on the top of this question booklet is same as that printed on the OMR sheet. In case it is different, please get it replaced with a question booklet with the same SET CODE as that of the OMR answer sheet from the invigilator.
3. Fill in the boxes given in the OMR sheet by using Blue or Black Ball-point pen.
4. **OPEN THE SEAL OF THE QUESTION BOOKLET ONLY AFTER THE ANNOUNCEMENT BY THE INVIGILATOR TO DO SO.**
5. Use **HB Pencil/Blue or Black Ball-point Pen to darken the appropriate circles in the OMR sheet. Darken only one circle for a question which you consider to be most correct. If more than one circle(s) are darkened for any question, it will be treated as the incorrect answer. A faintly darkened circle may be interpreted as wrong method of marking and may be rejected by the optical scanner.**
6. All Questions are compulsory.
7. Each correct answer will fetch 04 marks whereas each incorrect answer will lead to deduction of 01 mark. Each unattempted question will fetch zero mark.
8. Use blank spaces provided in the question booklet for rough work. Doing the rough work on the answer sheet is forbidden.
9. **The Answer sheet consists of two pages, the top one is the original answer sheet whereas the annexed one is carbon copy. Do not detach the carbon copy of the answer sheet by yourself. If the carbon copy is detached, the answer sheet will be rejected.**
10. If you finish answering, remain seated in your seat till the Answer Sheet and other materials are collected by the invigilator from you.
11. The carbon copy of the answer sheet will be detached by the invigilator at the end of the examination and returned to you.
12. You are warned not to adopt any unfair means during the examination.
13. Do not carry any cellular/mobile phone/electronic gadget into the Examination Hall.

This Question Booklet contains 32 pages excluding the cover page. There are 100 Questions [(Basic Math-25) + (General Knowledge-25) + (Eng-25) + (General Science-25)] in all. Check every page of this Question Booklet carefully. If you find it defective in any manner, ask for another Question Booklet of the same set within 10 minutes of the commencement of Examination.

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4. If twice the son's age (in years) is added to the father's age, the sum is 70. But if twice the father's age is added to the son's age, the sum is 95. The father's age is—

- (A) 30 years
- (B) 40 years
- (C) 50 years
- (D) 60 years.

5. If $ax^2 + bx + c = 0$ has equal roots then c is equal to :

- (A) $-\frac{b}{2a}$
- (B) $\frac{b}{2a}$
- (C) $-\frac{b^2}{4a}$
- (D) $\frac{b^2}{4a}$

(Space For Rough Work)

8. The least number that must be added to 269 to make it a perfect square is

- (A) 20
- (B) 18
- (C) 16
- (D) 14

9. If $x = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $y = \frac{\sqrt{3}-1}{\sqrt{3}+1}$, then the value of $x^2 - y^2$ is

- (A) $2\sqrt{3}$
- (B) $4\sqrt{3}$
- (C) $6\sqrt{3}$
- (D) $8\sqrt{3}$

(Space For Rough Work)

13. If $f(x) = \frac{2x+3}{x-2}$ and $x \neq 2, x \in R$, then the value of $\frac{1}{3}f(4)$ is :

(A) $\frac{6}{11}$

(B) $\frac{11}{6}$

(C) $\frac{3}{2}$

(D) 9

14. If $f : R \rightarrow R$ satisfies $f(x+y) = f(x) + f(y)$ for all $x, y \in R$ and $f(1) = 7$, then

$\sum_{r=1}^n f(r)$ is :

(A) $\frac{7n}{2}$

(B) $\frac{7(n+1)}{2}$

(C) $7n(n+1)$

(D) $\frac{7n(n+1)}{2}$

(Space For Rough Work)

17. If $a = 2$ and $b = 3$, then the value of $\left(\frac{1}{a} + \frac{1}{b}\right)^a$ is

- (A) $\frac{5}{6}$
- (B) $\frac{6}{5}$
- (C) $\frac{25}{36}$
- (D) $\frac{36}{25}$

18. The fourth proportional of 2, 3, 8 is

- (A) 12
- (B) 6
- (C) 3
- (D) 1

19. Two numbers are in the ratio 5 : 8. If 9 be added to each, they are in the ratio of 8 : 11. Then the numbers are——

- (A) 10 and 16
- (B) 15 and 24
- (C) 20 and 32
- (D) 25 and 40

(Space For Rough Work)

23. $V \propto \frac{1}{P}$ and $V = 12$ when $P = 5$. If $V = 10$, then P is equal to

- (A) $\frac{5}{12}$
- (B) $\frac{1}{2}$
- (C) $\frac{12}{5}$
- (D) 6

24. The value of $\frac{1}{2} \log_a 9 + \frac{1}{3} \log_a 64 - \frac{1}{2} \log_a 36$ ($a > 0, a \neq 1$) is

- (A) $\log_a 3$
- (B) $\log_a 2$
- (C) $\log_a 6$
- (D) $\log_a 9$

25. If $\text{antilog}(0.300) = 1.995$, the value of $10^{2.3}$ is :

- (A) 0.0001995
- (B) 0.001995
- (C) 0.1995
- (D) 199.5

(Space For Rough Work)

NE/GK. (2)

29. Pratiba Roy, the famous Odia author is awarded a National Award for 2011. Name the award.

- (A) Padma bhusan
- (B) Padma bibhusan
- (C) Jhanpith
- (D) Sarala Samman

30. Who invented bicycle ?

- (A) Stephenson
- (B) Macmillan
- (C) Edison
- (D) Johnson

31. Who invented telephone ?

- (A) Marconi
- (B) Darwin
- (C) Newton
- (D) Graham Bell

(Space For Rough Work)

NE/GK. (2)

36. Who is hanged on 9th Feb' 2013 in Tihar Jail for attack on the Indian Parliament ?

- (A) Azmal Kasab
- (B) Afzal Guru
- (C) Haneef
- (D) Sayeed Mohammad

37. The world famous 'Kumbh Mela' takes place once in :

- (A) 10 years
- (B) 12 years
- (C) 8 years
- (D) 6 years

38. Who presented the Union Budget 2013 ?

- (A) Pranab Mukherjee
- (B) P. Chidambaram
- (C) Sarad Power
- (D) Kapil Sibal

(Space For Rough Work)

NE/GK. (2)

42. National Science Day is celebrated on :

- (A) 28th March
- (B) 28th April
- (C) 28th February
- (D) 28th January

43. Kulu Charan Mahapatra was associated with :

- (A) Kuchipudi
- (B) Gotipua Dance
- (C) Odishi
- (D) Manipuri Dance

44. Pandit Rabi Shankar was associated with :

- (A) Flute
- (B) Tabla
- (C) Sitar
- (D) Guitar

(Space For Rough Work)

NE/GK. (2)

48. Who took over the regime of Tata Companies from Ratan Tata ?

- (A) Y. Debeswar
- (B) Anil Ambani
- (C) Cyrus Mistry
- (D) C. S. Raju

49. Why is Chandipur in Odisha famous ?

- (A) Crocodile Sanctuary
- (B) Tiger reserve
- (C) Sea beach
- (D) Missile testing

50. Santosh Trophy is associated with :

- (A) Basket ball
- (B) Football
- (C) Baseball
- (D) Hockey

(Space For Rough Work)

55. Light—— very fast.

- (A) travel
- (B) travels
- (C) is travelling
- (D) has been travelling

56. There is hardly—— tea left.

- (A) any
- (B) some
- (C) few
- (D) a few

57. Write the correct answer—— the question.

- (A) of
- (B) into
- (C) to
- (D) for

Identify the part A /B /C /D in the following sentences that has an error.

58. Faster you run, the cooler it gets.

- A B C D

59. This is the first time I am going to attend the meeting.

- A B C D

(Space For Rough Work)

running from me like a herd of deer, although I had no intention of attacking them. When I paused in front of a tailor's shop, he abandoned his machine and shut himself in a cupboard, wailing, "Alas, I am undone ! won't someone shoot that tiger ?"

66. The word I in the first line of the passage stands for :

- (A) The author
- (B) The tailor
- (C) The people
- (D) The tiger

67. The tiger had had the opinion before entering the Market Road that human beings were ——

- (A) strong and fearless
- (B) a herd of deer
- (C) in the attacking mood
- (D) behind the pillars

68. People watching the tiger in the circus were :

- (A) frightened
- (B) happy
- (C) making a noise
- (D) perturbed

(Space For Rough Work)

73. Abandoned :

- (A) stopped to work
- (B) continued to work
- (C) returned to work
- (D) started to work

Choose the right word from among the alternatives which is opposite in meaning :

74. Paused :

- (A) dropped
- (B) stopped
- (C) stood
- (D) paced

75. Like :

- (A) onlike
- (B) unlike
- (C) dislike
- (D) disdain

(Space For Rough Work)

79. The first person to see a living cell was :

- (A) Robert Hooke
- (B) Robert Brown
- (C) M. J. Schieiden
- (D) Antony von Leuwenhock.

80. Which cell is phylogenetically advanced ?

- (A) Unicellular organism
- (B) Multicellular organism
- (C) Eukaryotes.
- (D) Prokaryotes.

81. DNA is :

- (A) Always double standard
- (B) Rarely single standard
- (C) Always single standard
- (D) Rarely double standard

82. Lead in water causes

- (A) Eye damage
- (B) Loss of hair
- (C) Kidney damage
- (D) Arthritis.

(Space For Rough Work)

86. Water matching distilled water can be obtained by

- (A) Permutit process
- (B) Lime-soda process
- (C) Boiling
- (D) Ion-exchange method.

87. What is the valency of copper in CuO ?

- (A) 1
- (B) 2
- (C) 3
- (D) 4

88. The bond angle in ammonia is :

- (A) $109^{\circ}.28'$
- (B) 90°
- (C) 107°
- (D) $107^{\circ}.28'$

(Space For Rough Work)

PHYSICS

92. When sound travels from air to water, the quantity that remains unchanged is

- (A) Speed
- (B) Frequency
- (C) Intensity
- (D) Wavelength.

93. The boiling point of water decreases when surrounding

- (A) Temperature increases
- (B) Temperature decreases
- (C) Pressure increases
- (D) Pressure decreases.

94. Refractive index of water with respect to air is

- (A) $\frac{1}{2}$
- (B) $\frac{3}{4}$
- (C) $\frac{4}{3}$
- (D) $\frac{1}{3}$

(Space For Rough Work)

98. The ratio of displacement to the distance is
- (A) Always ≤ 1
 - (B) Always ≥ 1
 - (C) Maybe ≤ 1
 - (D) Always = 1
99. When a body moves along a straight line, the motion of the body is said to be
- (A) One dimensional
 - (B) Two dimensional
 - (C) Three dimensional
 - (D) Maybe any of these three.
100. What is the position of the boat when a person sitting in it and push one of the wall of the boat ?
- (A) Boat moves forward with a uniform velocity
 - (B) Boat moves forward with a non-uniform velocity
 - (C) Boat moves backward
 - (D) Boat remains at rest.

(*Space For Rough Work*)

BASIC MATHEMATICS

(Use of Calculator and Logarithm table not allowed)

1. If α and β are two roots of the equation $x^2 + x - 2 = 0$ then the value of $\alpha^{-1} + \beta^{-1}$ is
- (A) 2
(B) -2
(C) $\frac{1}{2}$
(D) $-\frac{1}{2}$
2. The value of α for which the system of equations $\alpha x + 3y = \alpha - 3$
 $12x + \alpha y = \alpha$
has no solution is :
- (A) -6
(B) -5
(C) 5
(D) 6
3. The length of a minute hand on the wall clock is 7 cm. The area swept by the minute hand in 30 minutes is :
- (A) 147 cm^2
(B) 210 cm^2
(C) 154 cm^2
(D) 77 cm^2

(Space For Rough Work)

6. The median of the following distribution is :

Weights (in kg.)	40	45	50	55	60	65	70
Number of persons	5	7	8	15	4	3	1

- (A) 55
(B) 50
(C) 45
(D) 60
7. For the following data
-1, 1, 0, 2, 3, 5, 5, 6, 8, 10, 11

- (A) Mean = Mode = Median
(B) Mean = Mode
(C) Mode = Median
(D) Mean = 5

(Space For Rough Work)

10. If the side of an equilateral triangle is $4\sqrt{3}$ cm, its area is :

(A) $\frac{12}{\sqrt{3}}$ cm²

(B) $\frac{24}{\sqrt{3}}$ cm²

(C) $12\sqrt{3}$ cm²

(D) $24\sqrt{3}$ cm²

11. The sides of a rectangular park are in the ratio 4 : 3. If its area is 1728 m² then the cost of fencing it at Rs. 2.50 per metre is :

(A) Rs. 320.00

(B) Rs. 420.00

(C) Rs. 840.00

(D) Rs. 680.00

12. The height of a parallelogram is one-third the base. If the area is 108cm², then its height is :

(A) 6 cm

(B) 7 cm

(C) 8 cm

(D) 9 cm

(Space For Rough Work)

15. A cylinder and a cone have the same height and the same radius of the base. The ratio between the volumes of the cylinder and the cone is :

- (A) 1 : 2
- (B) 1 : 3
- (C) 3 : 1
- (D) 2 : 1

16. The mean of the n scores $x_1, x_2, x_3, \dots, x_n$ is M . If $\sum_{i=1}^n (x_i - 12) = -10$ and $\sum_{i=1}^n (x_i - 3) = 62$, then the value of ' n ' is

- (A) 10
- (B) 8
- (C) 12
- (D) 9

(Space For Rough Work)

20. The area of a trapezium is 1080 cm^2 . If the lengths of its parallel sides are 55.6 cm and 34.4 cm , then the distance between them is :

- (A) 48 cm
- (B) 36 cm
- (C) 24 cm
- (D) 12 cm

21. The area of a rhombus is 119 cm^2 and its perimeter is 56 cm . Then its altitude is :

- (A) 8.1 cm
- (B) 8.3 cm
- (C) 8.5 cm
- (D) 8.7 cm

22. The curved surface area of a sphere is 1386 cm^2 . Its volume is

$$\left(\text{Take } \pi = \frac{22}{7} \right)$$

- (A) 2772 cm^3
- (B) 4851 cm^3
- (C) 5544 cm^3
- (D) 4158 cm^3

(Space For Rough Work)

GENERAL KNOWLEDGE

26. The Rajyarani Express in Odisha runs from :

- (A) Bhubaneswar to Jharsuguda
- (B) Bhubaneswar to Koraput
- (C) Bhubaneswar to Rourkela
- (D) Bhubaneswar to Berhampur.

27. Bill Gates, the famous Computer Software maker of USA, is associated with :

- (A) Infosys
- (B) WIPRO
- (C) Microsoft
- (D) Satyam

28. Delhi is situated on the bank of the river :

- (A) The Ganga
- (B) The Yamuna
- (C) The Bramhaputra
- (D) The Tapti

(Space For Rough Work)

32. What is the number of Squares on a chess board ?

- (A) 72
- (B) 64
- (C) 48
- (D) 54

33. The Latest Census in India was held in

- (A) 2000
- (B) 2010
- (C) 2011
- (D) 2012

34. The Davis Cup is associated with :

- (A) Football
- (B) Lawn Tennis
- (C) Hockey
- (D) Baseball

35. Who is the manufacturer of the Car 'Nano' ?

- (A) Maruti
- (B) Hyundai
- (C) Tata Motors
- (D) Honda

(Space For Rough Work)

39. Who is the Finance Minister of Odisha ?

- (A) Prafulla Ghadei
- (B) Maheswar Mohanty
- (C) Prasanna Acharya
- (D) Raghunath Mohanty

40. Malala Yousafzai, who was shot by the Taliban, belongs to :

- (A) Afganistan
- (B) India
- (C) Bangladesh
- (D) Pakistan

41. Who was the first women President of India ?

- (A) Sarojini Naidu
- (B) Indira Gandhi
- (C) Pratiba Patil
- (D) J. Jayalalitha

(Space For Rough Work)

45. What is the approximate playing time of the 'National Anthem' of India ?

- (A) 42 seconds
- (B) 52 seconds
- (C) 62 seconds
- (D) 32 seconds

46. Dhanraj Pillay is associated with :

- (A) Cricket
- (B) Football
- (C) Hockey
- (D) Lawn Tennis

47. Who is the only batsman in Indian cricket to score Triple century ?

- (A) Sachin Tendulkar
- (B) Sunil Gavaskar
- (C) Virendra Sehwag
- (D) V. V. S. Laxman

(Space For Rough Work)

ENGLISH

Each question carries ONE mark.

Choose the right alternative for each blank space in the following sentences :

51. We often send money—— post.

- (A) in
- (B) on
- (C) to
- (D) by

52. Do you mind—— a friend in need ?

- (A) helping
- (B) help
- (C) to help
- (D) being helped

53. We should have sympathy—— the poor.

- (A) to
- (B) of
- (C) towards
- (D) off

54. The full form of can't is——.

- (A) can not
- (B) cannot
- (C) canot
- (D) none of the above.

(Space For Rough Work)

60. A number of people have come to buy the tickets.
A B C D
61. There is no cure of cancer.
A B C D
62. Any school is always praised if it is producing good students.
A B C D
63. The injured is taken to the hospital for treatment.
A B C D
64. When the teacher was entering the class, all the students stood up.
A B C D
65. Are three-fourths of the field empty?
A B C D

Read the following passage mindfully and choose the correct statement in the light of the passage that follow :

It was still a busy hour in the city when I entered the Market Road. People ran for their lives at the sight of me. As I passed through, shutters were pulled down, and people hid themselves under culverts, on trees, and behind pillars. The population was melting out of sight. At the circus I had had no chance to study human beings. They sat in their seats peacefully while I cowered before the captain's whip. I got a totally wrong idea of human beings at that angle. I had thought that they were strong and fearless. But now I found them

(Space For Rough Work)

69. Seeing the tiger in the Market Road, people

- (A) gathered in one place
- (B) threw stones at the tiger
- (C) disappeared
- (D) were still busy in their work.

70. The tiger wanted to ——

- (A) kill the tailor
- (B) frighten the human beings
- (C) kill the deer
- (D) none of the above.

Choose the right word/expression which is very close in meaning to the word in relation to the passage :

71. Cowered :

- (A) shouted in joy
- (B) crouched in fear
- (C) caught the whip in fear
- (D) came forward

72. Culvert means underground passage for

- (A) People
- (B) Birds
- (C) Water
- (D) Wind

(Space For Rough Work)

GENERAL SCIENCE**BIOLOGY**

76. Anaerobic respiration after glycolysis is also called :

- (A) Multiplication
- (B) Fragmentation
- (C) Fermentation
- (D) Restoration.

77. Bio-degradable materials are :

- (A) Those which spoil the biological environment
- (B) Toxic in nature
- (C) Can be broken down by bacteria
- (D) Used to converting waste into greenery.

78. Frog respire through

- (A) Gills
- (B) Lungs
- (C) Skin
- (D) Gill clefts.

(Space For Rough Work)

CHEMISTRY

83. The total number of fundamental particles in one atom of C^{14} is :

- (A) 6
- (B) 8
- (C) 3
- (D) 4

84. Mass of electron is

- (A) 9.1×10^{-28} gm
- (B) 9.1×10^{-25} gm
- (C) 9.1×10^{-10} gm
- (D) 9.1×10^{-18} gm.

85. Hardness of water is due to

- (A) Dissolved organic matter
- (B) Dissolved Na and K salt
- (C) Dissolved Ca and Mg salt
- (D) Suspended matter.

(Space For Rough Work)

89. It is the one in which the atoms of each element are equal in both sides

- (A) Skeleton equation
- (B) Molecular equation
- (C) Atomic equation
- (D) Balanced equation

90. The chemical formula for Aluminium Nitride is

- (A) AlN_3
- (B) Al_3N
- (C) AlN
- (D) Al_2N_3

91. Co-valency is favoured by

- (A) Small cation and large anion
- (B) Large cation and small anion
- (C) Large cation and large anion
- (D) Small cation and small anion.

(Space For Rough Work)

95. The value of Absolute zero on the Fahrenheit scale is :

- (A) 273 °F
- (B) -459.4 °F
- (C) 0 °F
- (D) -182.7 °F

96. The ratio between potential difference and current is known as :

- (A) Conductance
- (B) Resistance
- (C) Heat capacity
- (D) Specific resistance

97. The velocity of sound is maximum in which of the following ?

- (A) Iron
- (B) Water
- (C) Mercury
- (D) Air.

(Space For Rough Work)