Foreman (Chemical)-2022

QCA Booklet No.: **2410121** *FCS/22*

2022

SCREENING TEST

Group—"A"

[ENGLISH]

Full marks : 30

Full Name of Candidate : _____

(In BLOCK Letters)

Roll No. : _____

_____ _____

Full signature of the Candidate *Full signature of Invigilator*

INSTRUCTIONS

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8. If you wish to cancel any work, draw your pen through it and write "Cancelled" across it, otherwise it may be valued.

2410121

PLEASE DO NOT WRITE ANYTHING ON THIS PAGE.
ALL OTHER PAGES SHOULD BE USED.

QCA Booklet No.: **2410121**

2022

SCREENING TEST

Group—"A"

[ENGLISH]

Full marks : 30

1. Answer *any one* of the following : 10×1=10

(a) Read the following passage and write précis of not more than 60 words.

The railways had a permanent and far-reaching influence on village life. Their life-giving injection of cheap and rapid transport revived old decayed fishing harbours into ship building centres, converted tiny inland route centres into railway towns. The scenery itself was changed. To secure the easy gradients demanded by railway engineers, great embankments and high viaducts were thrown across wide valleys; soaring bridges made light of deep river barriers; and tunnels, their portals massively decorated with turrets and battlements, penetrated steep hillsides. Little hamlets of railwaymen grew up around the stations, which were generally a mile or two from the centre of villages they served.

These new communities were related to existing villages, because railways served as major outlets for farm commodities and as a means of obtaining supplies of fertilizer and farm equipment. Slow passenger trains, stopping at country halts, provided a cheap way of getting to market towns, and there was the occasional excursion trip to the seaside or beauty spot. The poorest class of villagers and the farm labourers began to enjoy the advantages of railway travel only towards the end of the country, when wages had risen and the fares had come down.

(b) Read the following passage and write précis of not more than 60 words.

City life in today's world is too noisy and fast paced. Modern cities never sleep. The roads are constantly crowded with multitude of vehicles and it seems as if people spend half of their lives in their vehicles. Volume of traffic has witnessed an increase and frequency of traffic jams has also gone up as a result. Day and night stores, cinemas, restaurants have become a norm. Housing facilities are struggling to keep up with the increasing influx of population. People in cities are constantly on the run. The fret and fever of urban living consumes most of their energy and time. The rat-race is quite ruthless and all are being drawn incessantly into this pursuit of money and success. The pressures of working in a highly competitive society and the urge to keep on spending more is leading to immense stress among city-dwellers. A city is the modern man's battleground where he fights for survival. There is a constant competition for jobs, houses and support services like health and education. This cut-throat competition results in a lack of sensitivity towards fellow-citizens, and a feeling of hatred for those who are more successful.

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2. Answer *any one* of the following : 10×1=10

(a) A prominent building in the city had a fire accident. Write a report in the local newspaper about the incident. [Word limit : 100–120]

(b) You are a member of your College Team which participated in the National Science Exhibition, and presented your model on Saving Energy. Write a report for your College Magazine about the event. [Word limit : 100–120]

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3. Answer *any one* of the following : 10×1=10

(a) Write a letter to the editor of a local newspaper, expressing your concerns about the rise in pollution levels in and around your residential area.

(b) Write a letter to your friend informing him / her about the Environmental Awareness Workshop that was recently organised by your College Students' Council in the College Campus.

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SPACE FOR ROUGH WORK

2022

Screening Test

ENGLISH, INORGANIC CHEMISTRY & ORGANIC CHEMISTRY

Time Allowed — 2 Hours *Full Marks — 100*

Seperate Asnwer Book to be used for Group-A, Group-B and Group-C
(In case of Group—B & Group — C answer may be writtem either in Englsih or in Bengali, but all answers must be in one and the same language)

Group-A

1. Answer *any one* of the following : 10×1=10

(a) Read the following passage and write précis of not more than 60 words.

The railways had a permanent and far-reaching influence on village life. Their life-giving injection of cheap and rapid transport revived old decayed fishing harbours into ship building centres, converted tiny inland route centres into railway towns. The scenery itself was changed. To secure the easy gradients demanded by railway engineers, great embankments and high viaducts were thrown across wide valleys; soaring bridges made light of deep river barriers; and tunnels, their portals massively decorated with turrets and battlements, penetrated steep hillsides. Little hamlets of railwaymen grew up around the stations, which were generally a mile or two from the centre of villages they served.

These new communities were related to existing villages, because railways served as major outlets for farm commodities and as a means of obtaining supplies of fertilizer and farm equipment. Slow passenger trains, stopping at country halts, provided a cheap way of getting to market towns, and there was the occasional excursion trip to the seaside or beauty spot. The poorest class of villagers and the farm labourers began to enjoy the advantages of railway travel only towards the end of the country, when wages had risen and the fares had come down.

(b) Read the following passage and write précis of not more than 60 words.

City life in today's world is too noisy and fast paced. Modern cities never sleep. The roads are constantly crowded with multitude of vehicles and it seems as if people spend half of their lives in their vehicles. Volume of traffic has witnessed an increase and frequency of traffic jams has also gone up as a result. Day and night stores, cinemas, restaurants have become a norm. Housing facilities are struggling to keep up with the increasing influx of population. People in cities are constantly on the run. The fret and fever of urban living consumes most of their energy and time. The rat-race is quite ruthless and all are being drawn incessantly into this pursuit of money and success. The pressures of working in a highly competitive society and the urge to keep on spending more is leading to immense stress among city-dwellers. A city is the modern man's battleground where he fights for survival. There is a constant competition for jobs, houses and support services like health and education. This cut-throat competition results in a lack of sensitivity towards fellow-citizens, and a feeling of hatred for those who are more successful.

2. Answer *any one* of the following : 10×1=10

(a) A prominent building in the city had a fire accident. Write a report in the local newspaper about the incident. [Word limit : 100–120]

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   (a) Write a letter to the editor of a local newspaper, expressing your concerns about the rise in pollution levels in and around your residential area.

   (b) Write a letter to your friend informing him / her about the Environmental Awareness Workshop that was recently organised by your College Students' Council in the College Campus.

Group-B

1. What is meant by the term 'in situ' in chemistry? 1

2. What is the formula of sodium nitroprusside? 1

3. Distinguish between the terms 'aliquot' and 'aliquant' with a suitable example. 2

4. A 2·5 g sample of ground water was found to contain 5·4 μg of Zn^{2+}. What is the concentration of Zn^{2+} in ppm? 3

5. State whether the following reactions are *redox* or *non-redox*:

   (a) $2CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$ 1+1

   (b) $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$

6. Calculate the volume strength, v of a (i) 6·072%, and (ii) 3·57(N) H_2O_2 solution. 2+2

7. Write down the formula of borax crystal. State, with equation what happens when borax is heated in a platinum loop to a high temperature. 1+1+2

8. What mass of $NaHCO_3$ is required to prepare a 250 ml of 0·20(M) $NaHCO_3$ solution? (Molar mass of $NaHCO_3 = 84$ g mol^{-1}) 3

9. In the flame test for Ba^{2+}, the flame colour is

   (A) Yellow (B) Yellow-green (C) Brick-red (D) Blue 1

10. How would you detect Br^- and I^- in presence of each other? (Make a table : *Experiment*; *Observation*; *Inference* — Equation(s) not required) 3

11. Balance the following equation by the *ion-electron method:*

    $MnO_4^- + Cl^- \rightarrow Mn^{2+} + Cl_2$ (acid medium) 3

12. What is Devarda's alloy? 1

13. A scarlet red compound (A) is treated with concentrated nitric acid to give a chocolate brown precipitate (B). The precipitate is filtered, and the filtrate is neutralized with sodium hydroxide solution. Addition of potassium iodide to the resulting solution gives an yellow precipitate (C), which disappears on heating, but reappears on cooling as shining golden crystals. Identify (A), (B) and (C). [Names and formulae only— no equations are required.] 1+1+1

14. Suppose we have the following balanced chemical equation :

    p A (aq) + q B (aq) → r C (aq) + s D (aq)

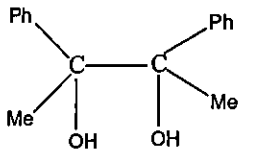
    where p, q, r and s are the moles of each substance involved in the reaction. Now, if V_A mL of M_A(M) solution of A react with V_B mL of M_B(M) solution of B, then prove that :

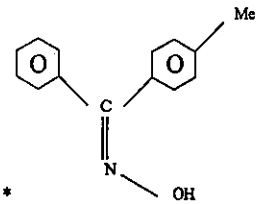
    $$\frac{M_A V_A}{M_B V_B} = \frac{p}{q}$$ 4

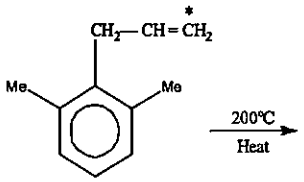
Group-C

1. How will you prepare the following crystalline derivatives of the compounds indicated? Give the procedure in brief and write down the equations involved. 3×3=9
   (a) Semicarbazone of acetone
   (b) Benzoyl derivative of a primary aromatic amine
   (c) Nitration of a mono-nitro aromatic compound to a dinitro derivative

2. Predict the major products in the following reactions. Write down the mechanisms and justify. Name and classify the reactions. 3×3=9

   (a) Treatment of  with concentrated sulphuric acid

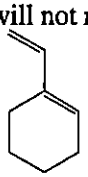
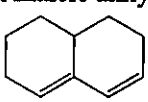
   (b) Treatment of  with concentrated sulphuric acid

   (c) 

   [*Denotes C^{14} labelling]

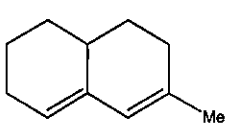
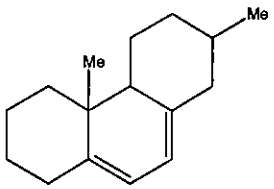
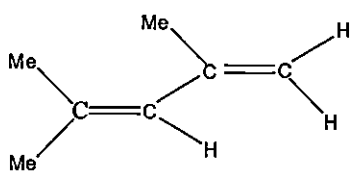
3. How would you carry out the following transformations. Write down the equations and explain the steps involved. 3×2=6
   (a) Phenol to Picric acid (b) Benzaldehyde to Cinnamic acid

4. Describe how will you detect the following functional groups. Briefly describe the procedure and give the reactions involved. 3+2=5
   (a) Nitro group in an aromatic compound containing both an amino and a nitro group
   (b) Hydroxamic acid test for esters

5. Which of the following dienes will not react with maleic anhydride in the Diels-Alder reaction. 1
   (a) 1, 3 – Butadiene (b)  (c) 

6. Give the approximate absorption wave-numbers of the functional groups indicated in the infra-red spectrum. ½×4=2
   (a) Acetophenone (b) Methyl ethyl kitone
   (c) Benzonitrile (Ph – CN) (d) Nitrobenzene

7. Predict the UV absorption maxima on the basis of Woodward-Fieser rules. 1×3=3

   (a)  (b)  (c) 

QCA Booklet No.: **2410261** *FCS/22*

2022

SCREENING TEST

Group—"B"

[INORGANIC CHEMISTRY]

Full marks : 35

Full Name of Candidate : _____

(In BLOCK Letters)

Roll No. : _____

Full signature of the Candidate *Full signature of Invigilator*

INSTRUCTIONS

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QCA Booklet No.: **2410261**

2022

SCREENING TEST

Group—"B"

[INORGANIC CHEMISTRY]

Full marks : 35

(In case of Group-'B' *answer may be written either in* English *or* Bengali, *but all answers must be in one and the same language*)

1.	What is meant by the term 'in situ' in chemistry?	1	Candidates must not write on this margin
2.	What is the formula of sodium nitroprusside?	1	
3.	Distinguish between the terms 'aliquot' and 'aliquant' with a suitable example.	2	

4. A 2·5 g sample of ground water was found to contain 5·4 μg of Zn^{2+}. What is the concentration of Zn^{2+} in ppm? 3

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5. State whether the following reactions are *redox* or *non-redox*:

(a) $2CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$ 1+1

(b) $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$

Candidates must not write on this margin

6.	Calculate the volume strength, v of a (i) 6·072%, and (ii) 3·57(N) H_2O_2 solution. 2+2	Candidates must not write on this margin

7. Write down the formula of borax crystal. State, with equation what happens when borax is heated in a platinum loop to a high temperature. 1+1+2

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8. What mass of $NaHCO_3$ is required to prepare a 250 ml of 0·20(M) $NaHCO_3$ solution? (Molar mass of $NaHCO_3 = 84$ g mol^{-1}) 3

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9. In the flame test for Ba^{2+}, the flame colour is

(A) Yellow (B) Yellow-green (C) Brick-red (D) Blue 1

10. How would you detect Br^- and I^- in presence of each other? (Make a table : *Experiment*; *Observation*; *Inference* — Equation(s) not required) 3

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11. Balance the following equation by the *ion-electron method:*

$MnO_4^- + Cl^- \rightarrow Mn^{2+} + Cl_2$ (acid medium) 3

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12.	What is Devarda's alloy?	1	Candidates must not write on this margin
13.	A scarlet red compound (A) is treated with concentrated nitric acid to give a chocolate brown precipitate (B). The precipitate is filtered, and the filtrate is neutralized with sodium hydroxide solution. Addition of potassium iodide to the resulting solution gives an yellow precipitate (C), which disappears on heating, but reappears on cooling as shining golden crystals. Identify (A), (B) and (C). [Names and formulae only— no equations are required.]	1+1+1	

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14. Suppose we have the following balanced chemical equation :

$p\,A\,(aq) + q\,B\,(aq) \rightarrow r\,C\,(aq) + s\,D\,(aq)$

where p, q, r and s are the moles of each substance involved in the reaction. Now, if V_A mL of M_A(M) solution of A react with V_B mL of M_B(M) solution of B, then prove that :

$$\frac{M_A V_A}{M_B V_B} = \frac{p}{q}$$ 4

Candidates must not write on this margin

SPACE FOR ROUGH WORK

QCA Booklet No.: **2410401** *FCS/22*

2022

SCREENING TEST

Group—"C"

[ORGANIC CHEMISTRY]

Full marks : 35

Full Name of Candidate : _____

(In BLOCK Letters)

Roll No. : _____

_____ _____

Full signature of the Candidate *Full signature of Invigilator*

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2410401

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QCA Booklet No.: **2410401**

2022

SCREENING TEST

Group—"C"

[ORGANIC CHEMISTRY]

Full marks : 35

(In case of Group-'C' *answer may be written either in* English *or* Bengali, *but all answers must be in one and the same language)*

1. How will you prepare the following crystalline derivatives of the compounds indicated? Give the procedure in brief and write down the equations involved.

(a) Semicarbazone of acetone

(b) Benzoyl derivative of a primary aromatic amine

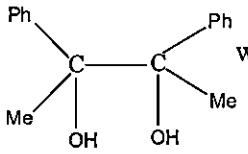
(c) Nitration of a mono-nitro aromatic compound to a dinitro derivative 3×3=9

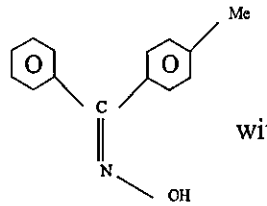
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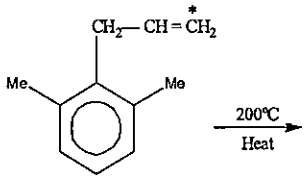
Candidates must not write on this margin

2. Predict the major products in the following reactions. Write down the mechanisms and justify. Name and classify the reactions. 3×3=9

Candidates must not write on this margin

(a) Treatment of  with concentrated sulphuric acid

(b) Treatment of  with concentrated sulphuric acid

(c) 

[*Denotes C^{14} labelling]

Candidates must not write on this margin

Candidates must not write on this margin

3. How would you carry out the following transformations? Write down the equations and explain the steps involved. 3×2=6

(a) Phenol to Picric acid

(b) Benzaldehyde to Cinnamic acid

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Candidates must not write on this margin

4. Describe how will you detect the following functional groups. Briefly describe the procedure and give the reactions involved. 3+2=5

(a) Nitro group in an aromatic compound containing both an amino and a nitro group

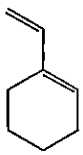
(b) Hydroxamic acid test for esters

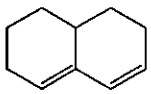
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Candidates must not write on this margin

5. Which of the following dienes will not react with maleic anhydride in the Diels-Alder reaction? 1

(a) 1, 3 – Butadiene

(b) 

(c) 

Candidates must not write on this margin

6. Give the approximate absorption wave-numbers of the functional groups indicated in the infra-red spectrum. ½×4=2

(a) Acetophenone

(b) Methyl ethyl kitone

(c) Benzonitrile (Ph – CN)

(d) Nitrobenzene

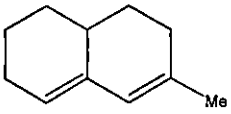
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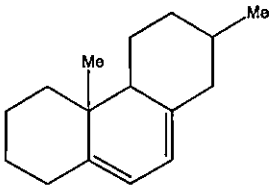
7. Predict the UV absorption maxima on the basis of Woodward-Fieser rules. 1×3=3

Candidates must not write on this margin

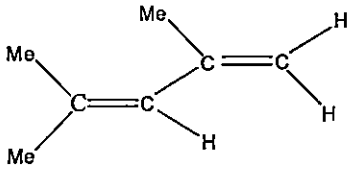
(a)



(b)



(c)



Candidates must not write on this margin

Candidates must not write on this margin

SPACE FOR ROUGH WORK