



THE TIMES OF INDIA

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TODAY'S EDITION

➤ Sample papers are back! This week, we bring you maths and chemistry mock papers prepared by your teachers
PAGE 2



➤ How to deal with your child's learning disabilities
➤ We tell you the importance of self love
PAGE 3



➤ Is England's rotation policy doing them more harm than good?
PAGE 4



STUDENT EDITION

FRIDAY, FEBRUARY 19, 2021



WEB EDITION

CLICK HERE: PAGE 1 AND 2

Synthetic MEAT

WHAT

In his new book, 'How to Avoid a Climate Disaster', business magnate and philanthropist Bill Gates has given a solution to the impending climate change disaster: **Switch to synthetic meat.** "I think all the rich countries should move to 100% synthetic beef," Gates said in an interview, on how to cut back on methane emissions. **Synthetic meat, also known as 'cultured meat' or 'clean meat', is a type of meat, which is grown in the lab by using animal cells, instead of using the whole animal.**

WHERE

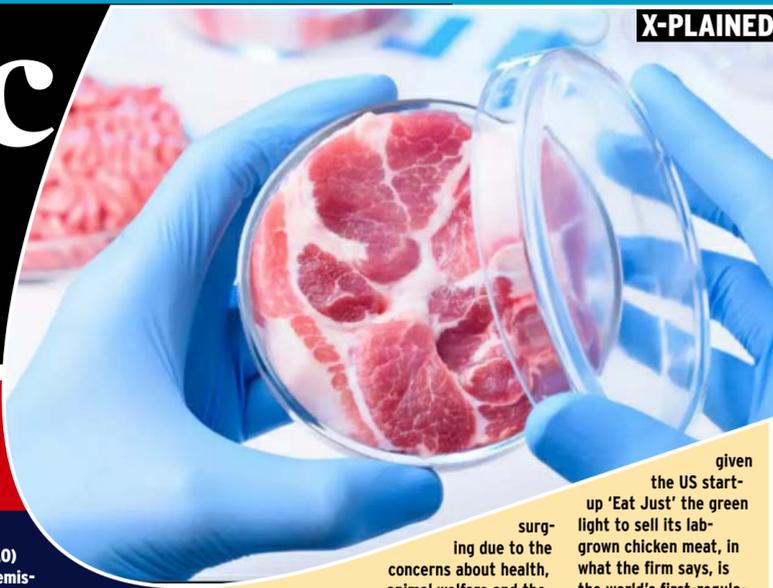
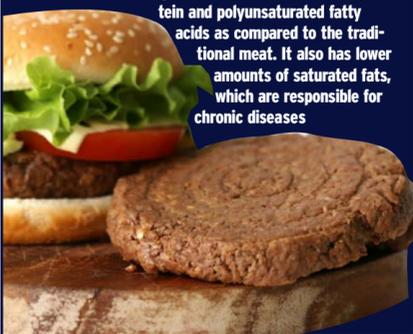
DID IT COME FROM: The concept of this type of cellular agriculture was popularised in the early 2000s. Later, in 2013, the first lab-grown burger patty was introduced as a proof to the concept of synthetic meat. Jason Matheny, a co-author to a seminar paper on cultured meat production, popularised the concept of 'synthetic meat' during the early 2000s. He also launched the 'New Harvest', which is the world's first non-profit organisation to support artificial meat research.

HOW

IS SYNTHETIC MEAT MADE: Cells. According to scientists, cells, which grow to make or regenerate our body, can also be grown under the laboratory conditions to make meat. It starts with a few 'satellite' cells, which can be obtained from a small sample of muscle taken from a live animal. Scientists say just one cell could, in theory, be used to grow an infinite amount of meat. When fed to a nutrient-rich serum, the cells turn into muscle cells and proliferate, doubling in number, roughly every few days. After the cells multiply, they are encouraged to form strips, much like how muscle cells form fibres in a living tissue. These fibres are attached to a sponge-like scaffold that floods the fibres with nutrients and mechanically stretches them, 'exercising' the muscle cells to increase their size and protein content. The resulting tissue can then be harvested, seasoned, cooked and consumed as boneless-processed meat.

WHY SYNTHETIC?

- A 2013 study by the UN Food and Agriculture Organisation (FAO) estimated that the total annual emissions from animal agriculture (production emissions plus land-use change) were about 14.5 per cent of all the human emissions, of which beef contributed 41 per cent
- An estimated 50 billion chickens go to slaughter each year for food, excluding male chicks and unproductive egg-laying hens, according to the World Economic Forum. These chickens consume large quantities of soy and corn, which causes deforestation
- It is healthier than the actual meat: Health experts are of the view that synthetic meat contains more protein and polyunsaturated fatty acids as compared to the traditional meat. It also has lower amounts of saturated fats, which are responsible for chronic diseases



X-PLAINED

IS IT A VIABLE OPTION?

➤ According to experts, the demand for alternatives to regular meat is

- **surging** due to the concerns about health, animal welfare and the environment
- Plant-based substitutes, popularised by the likes of Beyond Meat, Impossible Foods and Quorn, are increasingly featuring on the supermarket shelves and restaurant menus
- In fact, some countries like Singapore has

given the US start-up 'Eat Just' the green light to sell its lab-grown chicken meat, in what the firm says, is the world's first-regulatory approval for the clean meat that does not come from slaughtered animals

➤ But the so-called clean or cultured meat, which is grown from animal muscle cells in a lab, is still at a nascent stage, given its high production costs

WHAT ABOUT INDIA?

Experts say cultured meat may be available in India by 2025, which will allow the meat consumers to enjoy animal products without killing or harming the animal. The Humane Society International (HSI), India, has joined hands with



the Centre for Cellular and Molecular Biology (CCMB) in Hyderabad for developing lab-grown meat in India

INDIA-MADE IPAD COULD BE A REALITY SOON

Apple Inc is angling to participate in a new scheme to boost India's exports of computer products, part of what government and industry sources say are plans to bring iPad tablet manufacturing to the country. India launched a \$6.7 billion plan to boost smartphone exports last year, as PM Narendra Modi stepped up efforts to promote electronics manufacturing and create jobs.

- Apple, which has steadily raised the production of iPhones in India to lessen its dependence on Chinese manufacturing, took part in that scheme via its contract manufacturers
- Now, the government is preparing to unveil another incentive to drive local manufacturing of IT products including tablets, laptops and servers, sources said
- The new performance-linked incentive (PLI) scheme, which offers cash-back to manufacturers for exports, will have a budget of up to ₹ 7,000 crore (\$964.5 million) over five years, the sources said. It's expected to be launched by the end of February

JUST LIKE THAT AJIT NINAN



Fuel hike car pools

JEFF BEZOS IS WORLD'S RICHEST MAN AGAIN after Elon Musk's fortune dips by \$4.6 bn

RICHIE RICH CLUB

Jeff Bezos has reclaimed the title of the world's richest person, pushing Tesla boss Elon Musk to the second position on the Bloomberg Billionaire Index. With a fortune of \$191.2 billion, the Amazon founder is back at the top of the rich list, after being pushed to the second spot for six weeks in January 2021, owing to a continued rally in Tesla stocks. Due to the recent movement in stock prices of Amazon and Tesla, Bezos is now \$995 million richer than Musk.

- Musk displaced Bezos from the pole position last month after the latter held the position for three years
- The year 2021 has been eventful for the Amazon founder since his decision to step down from the position of CEO and hand over the mantle to Andy Jassy, who currently heads Amazon Web Services. Bezos transformed the company, which he started as an online bookstore in 1995 into a \$1.7 trillion global e-commerce behemoth



ECONOMY

MORGAN STANLEY RAISES INDIA'S GDP GROWTH FORECAST



Morgan Stanley has raised India's GDP growth estimates by 200basis points (bps) for F22 and 50bps for F23 in view of the supportive policy mix and synchronous recovery in domestic and external demand. India is on the cusp of a virtuous growth cycle, it said, adding that the policy rate hikes are expected to start from 4Q21.

Morgan Stanley believes that the economy is at an inflection point that marks the start of a new virtuous growth cycle. It has also upgraded the estimates of India's GDP growth to 12.1 per cent for F22 (from 10.1 per cent) and 6.7 per cent for F23 (from 6.2 per cent)



MAY CONSIDER RUNNING FOR PRESIDENT OF US: DWAYNE JOHNSON

BUZZ

Dwayne 'The Rock' Johnson has opened up about whether he'd consider an eventual run for US President. "I would consider a presidential run in the future, if that's what the people wanted," he told USA Today. "Truly I mean it, and I'm not flippant in any way with my answer," Johnson added. The Jumanji star is currently promoting a new NBC series based on his life called 'Young Rock', where, in the year 2032, he launches a presidential run. In real life, the decision to run for President would be "up to the people", he said. "So I would wait, and I would listen. I would have my finger on the pulse, my ear to the ground."

1 Back in 2017, the former pro-wrestler said, there was a "real possibility" that he would run for the hot seat

2 In the past, Johnson, who is a registered Independent, with no centrist ideologies, spoke

at the Republican National Convention in 2000, and attended the Democratic National Convention the same year

3 More recently, Johnson endorsed President Joe Biden during his 2020 run

Now, a smart helmet that can save fuel

Students of Ashoka Institute of Technology and Management in Varanasi have made a smart helmet that has the potential to save lives and fuel...

INNOVATION



representational pic

➤ According to the students of the institute, the smart helmet that works on radio frequency transmitters, is fitted with the sensors, which will automatically turn off the bike, when the stop sign glows at the traffic intersection. However, for this, the wearer of the helmet needs to be within 50 metres of the traffic signal. This will save petrol, they added

➤ Explaining how the device works, the students said, the device has two transmitters and a receiver. While one transmitter is installed in the helmet, which will become active on wearing the helmet, the receiver needs to be installed in the bike. The receiver gets switched on when the bike starts and the rider wears the helmet

➤ Simultaneously, the second transmitter gets located near the intersection signal system, and as soon as the vehicle comes in contact with the transmitter engaged in the red signal, the receiver in it stops the bike, they added

➤ Moreover, in case of an accident, the sensors installed in the helmet will send location to the police, ambulance and the family of the victim for help

CONQUER MATH WITH PRACTICE AND SPEED



EXAMS
Rfun

CLASS: XII - 2020-21

SUBJECT:

MATHEMATICS (ISC)

Time Allowed: 3 Hours

Maximum Marks: 80

GENERAL INSTRUCTIONS

- The question paper consists of three sections A, B and C.
- Candidates are required to attempt all questions from Section A
- Answer all questions EITHER from Section B OR Section C
- SECTION A: Internal choice has been provided in one question of two marks each, two questions of four marks each and two questions of six marks each.
- SECTION B: Internal choice has been provided in two questions of four marks
- SECTION C: Internal choice has been provided in two questions of four marks

SECTION-A

- Q1. Choose the correct option:**
i) The domain of the function defined as $f(x) = \sin^{-1}(2x-3)$ is
a) $[1, 2]$ b) $(1, 2)$
c) $R - (1, 2)$ d) None of these
- ii) The value of $\int_1^2 x^2 \cos x \, dx$ is
a) 1 b) 2 c) 3 d) 0
- iii) The tangent to the parabola $y^2 = 4x$ at (9, 6) is
a) $3x - y = 21$ b) $3x + y = 33$
c) $x - 3y + 9 = 0$ d) $x + 3y = 27$
- iv) The principle value of $\cos^{-1}(\cos \frac{4\pi}{3})$
a) $\frac{5\pi}{6}$ b) $\frac{2\pi}{3}$ c) $\frac{2\pi}{3}$ d) $\frac{\pi}{3}$
- v) If $A = \begin{bmatrix} 0 & 3 \\ x & 0 \end{bmatrix}$ is skew symmetric, the value of x is
a) 3 b) -3 c) 6 d) -6
- vi) The order and degree of the differential equation $(\frac{dy}{dx})^3 + (\frac{d^2y}{dx^2})^2 = 0$ are a and b , $2a+3b=$
a) 5 b) 12 c) 10 d) 6
- vii) Two balls are drawn without replacement from a bag containing 6 black balls and 4 red balls the probability that both are black is
a) $\frac{1}{10}$ b) $\frac{2}{7}$ c) $\frac{3}{5}$ d) $\frac{1}{3}$
- viii) The intervals in which $f(x) = \sin 2x$ is increasing $x \in (0, \frac{\pi}{2})$

Paper set by Raghavan Badrinath, Gitanjali School, Hyderabad



a) $(0, \frac{\pi}{4}) \cup (\frac{3\pi}{4}, \pi)$ b) $(\frac{\pi}{4}, \frac{3\pi}{4})$
c) $(\frac{\pi}{2}, \pi)$ d) $(\frac{\pi}{4}, \frac{\pi}{2})$

ix) If the matrix $\begin{bmatrix} 2 & 1 & -2 \\ 3 & 1 & 2 \\ x & 2 & 4 \end{bmatrix}$ given is singular, $x=$
a) -6 b) 3 c) 6 d) 2

x) If in a set of triangles on a plane the relation R defined as $aRb \Leftrightarrow a \equiv b$ is
a) reflexive b) symmetric
c) transitive d) equivalence [10]

Q2. i) Find the value of $\lim_{x \rightarrow 0} \frac{2x - x^2}{\sqrt{1+x} - \sqrt{1-x}}$

ii) From cards numbered from 1 to 30 one card is drawn at random. Find the probability the drawn card is a multiple of 4 or 5

iii) Find the slope of normal to the curve $y^2 = 8x$ at (2, -4)

iv) Find the Range of the function $f(x) = 2x^2 - 7x + 3$

v) Find the integrating factor of differential equation $x^2 \frac{dy}{dx} - xy = 2x + 3$ [5]

Q3. A die is thrown once if the outcome is greater than 4, find the probability that it's a prime. [2]

OR

From cards numbered from 1 to 30,

five cards are drawn at random and arranged in ascending order, find the probability that card numbered 18 is exactly in the middle

Q4. Solve the differential function: $(x^2+1) \frac{dy}{dx} - 2xy = 0$ [2]

Q5. Evaluate: $\int_0^a x(a-x)^n \, dx$ [2]

Q6. Find the point on the curve $y = x^2 - 6x^2 + 12x - 10$ where the tangent is parallel to X axis [2]

Q7. If $y = x^e$ find $\frac{dy}{dx}$ [2]

Q8. If $y = \frac{x \sin^{-1} x}{\sqrt{1-x^2}}$ prove that $(1-x^2) \frac{dy}{dx} = x + \frac{y}{x}$ [4]

Q9. Evaluate: $\int \tan x \cdot \tan 2x \cdot \tan 3x \, dx$ [4]
(OR)
 $\int \tan^{-1} \frac{\sqrt{1-x^2}-1}{x} \, dx$

Q10. Show that the tangent at any point θ to the curve $x = a \cos \theta$ and $y = a \sin \theta$ is at a constant distance from the origin [4]

(OR)
Find the intervals in which $f(x) = x^3 - 12x + 8$ is increasing [4]

Q11. Solve for x : $\cos^{-1} \left(\frac{1-x}{1+x} \right) = 2$ [4]

Q12. An open tank with a square base of side 'x' meters and vertical 'h' meters is to be constructed so as to contain 'c' cubic meters of water. Show that the expenses of lining the inside of the tank

with lead would be least if $h = x/2$. [6]

Q13. In a bolt factory machines A, B and C manufacture respectively 25%, 35% and 40% of the total bolts, of their output 5, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the production at the end of the day. If the bolt drawn is found to be defective find the probability that it is manufactured by the machine B [6]

Q14. Find A^{-1} if $A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 3 & -1 \\ 1 & 1 & 1 \end{bmatrix}$
hence solve the system of linear equation $x - 2y + 3z = 6$
 $2x + 3y - z = 5$
 $x + y + z = 6$ [6]

Q15. Evaluate: $\int \frac{3x-2}{(x+1)^2(x+3)} \, dx$
(OR)
 $\int \frac{x + \sin x}{1 + \cos x} \, dx$ [6]

SECTION-B

Q16. Choose the correct option:
i) The angle between vectors \vec{a} and \vec{b} whose magnitude are 3 and 2 respectively, if $\vec{a} \cdot \vec{b} = 3$ is
a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$

ii) If the straight line l is given by $\frac{3x-1}{3} = \frac{4-y}{5} = \frac{z+1}{2}$, then direction ratio's of line l .
a) (3 -5 2) b) (1 5 -2) c) (1 -5 2) d) None of these [2]

Q17. Find the angle between the vectors $\vec{a} = 3\hat{i} - 2\hat{j} + 6\hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} + 2\hat{k}$ [1]

Q18. Find the equation of the line parallel to the vector $3\hat{i} + 2\hat{j} - \hat{k}$ and passing through the point (3, -2, 1) [1]

Q19. Find the volume of the tetrahedron whose coterminal edges are $2\hat{i} - 2\hat{j} + \hat{k}$, $3\hat{i} + 2\hat{j} - \hat{k}$ and $\hat{i} + \hat{j} + \hat{k}$ [1]

Q20. Find the area of the triangle enclosed by the line $4x + 3y = 12$ with coordinate axes using integration [2]

Q21. Find the foot of the perpendicular from P (1, 2, 3) onto the line

$\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$ [4]

(OR)
Find the equation of the plane passing through the intersection of planes $3x + 2y - z + 1 = 0$ and $x + 2y - 2z + 3 = 0$ and perpendicular to the plane $2x - y - 3z - 4 = 0$

Q22. Find the area enclosed by the parabola $y = x^2 - 4x + 5$ & the line $y = x + 1$ [4]

(OR)
Find the area enclosed by the curves $y = \cos x$, $y = \sin x$ and X axis in $(0, \pi/2)$

SECTION-C

Q23. Choose the correct option:
i) If the cost of producing x articles is given by $C(x) = 3x^2 + x - 2$, the marginal cost at $x=5$ is
a) 32 b) 36 c) 13 d) 31

ii) The regression lines are $x + 2y = 7$ and $3x + y = 6$, then (\bar{x}, \bar{y}) is
a) (1, 3) b) (3, 1) c) (6, 4) d) (4, 6) [2]

Q24. Find the cost of producing 20 articles whose fixed cost is Rs.1200 if marginal cost is given by $M = 4x + 3$ [1]

Q25. If the average cost function is given by $A = 4x + 7 + 2/x$, find the marginal cost function [1]

Q26. If $b_{xy} = 0.75$ & $b_{yx} = 0.6$, find Karl Pearson's coefficient of correlation [1]

Q27. If the demand of a commodity is given by $p = 4x + 5$ then find Marginal revenue at $x=2$ [2]

Q28. The marks obtained by 10 students in English and Mathematics are given below: [4]

Marks in Economics	30	23	38	41	31	32	37	44	37	40
Marks in Mathematics	37	32	33	35	24	28	39	35	40	38

Find the equation of regression line y on x

(OR)
If the regression equation of x on y is given by $lx - y + 10 = 0$ and the regression line of y on x is given by $-2x + 3y - 14 = 0$. Determine the value of 'l' if the coefficient of correlation is $1/\sqrt{10}$ [4]

Q29. Determine graphically the minimum value of the objective function $z = -50x + 20y$, subject to constraints $2x - y \geq -5$, $3x + y \geq 3$, $2x - 3y \leq 12$ & $x, y \geq 0$ [4]

Find the catalyst to drive scores up

PAPER SET BY RAGINI P V, M G SCHOOL FOR EXCELLENCE, BENGALURU

MOCK PAPER

EXAMS
Rfun

SUBJECT:

CHEMISTRY (ISC)

(2020-21)

CLASS XII,

TOTAL MARKS: 70

Q1. a) Fill in the blanks by choosing the appropriate word/words from those given in the brackets: [4×1]

(increase, methanol, less, decreases, vapour, reduced, 2-iodo-2-methylpropane, carbon monoxide)
i) The _____ pressure of an aqueous solution of 0.1M cane sugar is _____ than that of pure water.

ii) In blast furnace, iron oxide is _____ to iron by _____.

iii) 2-methoxy-2-methylpropane on heating with HI at 373 K gives _____ and _____.

iv) A catalytic promoter _____ the efficiency of a catalyst whereas a catalytic poison _____ the efficiency of catalyst.

b) Select the correct alternative from the choices given: [4×1]

i) If a salt bridge is removed from the two half-cells, the voltage:
a) Does not change
b) Drops to zero
c) increases gradually
d) increases rapidly

ii) Which of the following is used as food preservative as well as antioxidant?
a) Sodium metabisulphite
b) Sodium chloride
c) sodium benzoate d) BHA

iii) Which of the following arrangements represents the correct order of electron gain enthalpy (with negative sign) of the given atomic species?
a) $F < Cl < O < S$
b) $S < O < Cl < F$
c) $Cl < F < S < O$
d) $O < S < F < Cl$

iv) Zeolites are:
a) Shape-selective catalysts
b) Liquid catalysts
c) enzyme catalyst
d) non-specific catalyst

c) Match the following: [4×1]

i) Sulphanilic acid a) covalent crystal
ii) Silicon carbide b) Dow's process
iii) Phenol c) Gattermann reaction
iv) Benzene d) Zwitter ion diazonium chloride

d) Answer the following questions: [4×2]

i) Give reason:

1) $La(OH)_3$ is more basic than $Lu(OH)_3$
2) Transition metals form alloys

ii) The complex $CoBr_3 \cdot 4NH_3 \cdot 2H_2O$ has molar conductivity corresponding to 3:1 electrolyte. Write the structural formula and its IUPAC name.

iii) A solution prepared by dissolving 0.30g of an unknown the compound in 30 g of CCl_4 has a boiling point that is $0.392^\circ C$ higher than that of pure CCl_4 . Calculate the molecular weight of solute. ($K_b = 5.02^\circ C/m$)

iv) Identify the compounds A, B, C, D in the given reaction:
 $CH_3CHO \xrightarrow{LiAlH_4} A \xrightarrow{P+H_2} B$
alc. KCN, C, H₂O, D

Q2. a) For an elementary reaction, $2X + Y \rightarrow 3Z$ the rate of disappearance of Z at time 't' is $1.3 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$. Calculate at this time, [2]
i) The rate of reaction and
ii) rate of disappearance of X.

(OR)
b) The decomposition of N_2O_5 (g) is a first order reaction with a rate constant of $5 \times 10^{-4} \text{ s}^{-1}$ at $45^\circ C$. If the initial concentration of N_2O_5 is 0.25M, calculate its concentration after 2 min. Also calculate half-life for the decomposition of N_2O_5 (g).

Q3. a) What are the main constituents of Dettol? [2]

b) What class of drug is ranitidine? [2]

Q4. How will you bring out the following conversions? [2]
a) Ethanol to ethyl fluoride
b) Propene to 1-nitropropane

Q5. a) Name one fibrous and one globular protein. [2]

b) What do you mean by non-essential amino acids? [2]

Q6. A substance is reduced to one third of its original concentration in 100 min. Calculate the time in which it will be reduced to one ninth of its original value assuming first order reaction. [2]

Q7. a) You are given benzene, conc. H_2SO_4 and NaOH. Write the equations for the preparation of Phenol using these reagents. [2]

(OR)
b) How will you obtain the following compounds from phenol?
1) Picric acid 2) Salicylaldehyde

Q8. Write the main structural differences between DNA and RNA. [2]

Q9. a) An aqueous solution freezes at $272.4 K$, while pure water freezes at $273.0 K$. Determine [2]
i) The molality of the solution
ii) Boiling point of the solution
iii) Lowering of vapour pressure of water at $298 K$

(Given: $K_f = 1.86 K \text{ kg mol}^{-1}$; $K_b = 0.512 K \text{ kg mol}^{-1}$; vapour pressure of water at $298 K = 23.756 \text{ mm Hg}$) [3]

(OR)
b) A solution of sucrose has been prepared by dissolving 68.4 g of sucrose in one kg of water. Calculate

GENERAL INSTRUCTIONS

(i) All questions are compulsory.

(ii) Question 1 is of 20 marks having four subparts, all of which are compulsory.

(iii) Question 2 to 8 carry 2 marks each, with two questions having an internal choice.

(iv) Question 9 to 15 carry 3 marks each, with two questions having an internal choice.

(v) Question 16 to 18 carry 5 marks each, with an internal choice.

(vi) When solving numerical problems, use the following data:
Gas constant $R = 1.987 \text{ cal deg}^{-1} \text{ mol}^{-1} = 8.314 \text{ JK}^{-1} \text{ mol}^{-1} = 0.0821 \text{ dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1} = 11 \text{ atm}^{-1} \text{ dm}^3 \text{ atm}^{-1} \text{ mol}^{-1}$
1 Faraday = 96500 coulombs. Avogadro's number = 6.023×10^{23}

Q7. a) You are given benzene, conc. H_2SO_4 and NaOH. Write the equations for the preparation of Phenol using these reagents. [2]

(OR)
b) How will you obtain the following compounds from phenol?
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i) The molality of the solution
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(Given: $K_f = 1.86 K \text{ kg mol}^{-1}$; $K_b = 0.512 K \text{ kg mol}^{-1}$; vapour pressure of water at $298 K = 23.756 \text{ mm Hg}$) [3]

(OR)
b) A solution of sucrose has been prepared by dissolving 68.4 g of sucrose in one kg of water. Calculate

the following:
i) The vapour pressure of the solution at $298 K$.

ii) Osmotic pressure of the solution.

iii) Freezing point of the solution. (Given: Vapour pressure of water at $298 K = 0.024 \text{ atm}$; K_f for water = $1.86 K \text{ kg mol}^{-1}$)

Q10. Aluminum crystallises in a cubic close pack structure. Its metallic radius is 125 pm. [3]
i) What is the edge length of the unit cell?
ii) How many unit cells are there in one cm^3 of Al?
iii) What is the density? (Atomic mass of Al = 27)

Q11. Describe the role of the following: [3]
i) Depressant in the froth floatation process.
ii) Silica in the extraction of Cu from copper pyrites.
iii) Cryolite in the metallurgy of Al.

Q12. For the complex $[Fe(en)_2Cl_2]Cl$ identify the following: [3]

i) Name of the complex
ii) Hybridisation and shape of complex
iii) Magnetic behavior of the complex

Q13. a) The elements of 3d transition series are given: [3]
Sc Ti V Cr Mn Fe Co Ni Cu Zn

Account for the following:
i) Which element shows maximum number of oxidation state?
ii) Which element shows only +3 oxidation state?
iii) Which element has the highest melting point? (OR)

b) Give reason:
i) Actinoid contraction is greater than the lanthanoids.
ii) Ce (III) can be easily oxidized (Atomic number = 58).
iii) $KMnO_4$ forms purple coloured solution.

Q14. Write balanced chemical equations: [3]
1) Gabriel phthalimide synthesis
2) Schotten - Baumann reaction
3) Coupling reaction

Q15. Write one difference in each of the following: [3]
i) Multimolecular and macromolecular colloids.
ii) Lyophobic and lyophilic sols.
iii) Homogeneous and heterogeneous catalysis

Q16. a) For a cell $Zn(s)/Zn^{2+}(0.0004M) // Cd^{2+}(0.2M)/Cd(s)$, the standard reduction potential of Zn^{2+}/Zn and Cd^{2+}/Cd are $-0.763V$ and $-0.403V$ respectively. [5]
i) Give the cell reaction
ii) What is the standard cell emf, E° ?
iii) What will be the emf, E for the cell reaction at $25^\circ C$?
iv) Calculate ΔG for the cell reaction.

v) Predict whether the cell reaction is spontaneous or not? (OR)

b) i) The resistance of $0.5 N$ solution of an electrolyte in a conductivity cell was found to be 25Ω . Cal-

culate the conductance, specific conductivity and equivalent conductivity of the solution if the electrodes in the cell are 1.6 cm apart and have an area of 3.2 cm^2 .

ii) How many hours does it take to reduce 3 moles of Fe^{3+} to Fe^{2+} with 2.0 A of current?

Q17. a) Give reason for the following: [5]
1) Thermal stability of water is greater than H_2S .
2) SO_2 is reducing while TeO_2 is an oxidizing agent.
3) ClF_3 exists but FCl_3 does not.
4) White P is kept under water.
5) Noble gases have comparatively large atomic sizes.

(OR)
b) i) Give the structure, shape and hybridisation of:
i) XeF_4 ii) XeO_3
2) Give balanced chemical equation for the following:
i) Action of conc. H_2SO_4 on NaCl in the presence of MnO_2 .
ii) Copper reacts with hot concentrated nitric acid

Q18. a) Bring out the following conversions: [5]
1) Formic acid to formaldehyde
2) Benzoyl chloride to benzaldehyde
3) Acetaldehyde to 2-propanol

(OR)
b) i) How will you prepare the following compounds from benzene?
1) Benzaldehyde
2) Acetophenone

Give one chemical test to distinguish between the following pairs of compounds: