FYBA/FYBCom./FYBSC
March 2024, Sem-I
ATKT Exam.

FYBSC
ATKT Exam
Sem-I
March-2024

Time : [illegible] Hours [Total Marks: 75]

N.B. 1) All questions are compulsory.
2) Figures to the right indicates full marks.

Q. 1 (A) Choose the correct alternative (Any eight) 08

1) The state of Maharashtra has ..... language as listed in the eighth schedule as its sole official language.
(Hindi, Konkani, Marathi)

2) In..... there is farsightedness but not short sightedness.
(Hypermetropia, Myopia, Onomatopoeia)

3) Anti-Hindi language agitations took place in..... India.
(North, South, Western)

4) Article 29(A) of the Universal Declaration of Human Rights, adopted by the UN in .....
(1905, 1948, 1991)

5) The First women ambassador .....
Vijaya Lakshmi Pandit, Sarojini Naidu, Savitribai Phule

6) The Eight Schedule to the Constitution lists ..... official languages.
(21, 22, 24)

7) In India the state of ------ has the lowest gender ratio.
(Rajasthan, Haryana, Punjab)

8) The Belgaum border dispute is a dispute involving the Indian states of Karnataka and Maharashtra
(Belgaum, Sangli , Pune)

9) Rights and Duties are ..... term.
(opposite, correlative, unrelated)

10) Rajiv Gandhi Government introduced the 64th Constitutional Amendment in the Parliament in 1989 to revitalise the Panchayati raj system.
(64, 73, 74)

(B) State whether the following statements are True or False (Any seven) 07

1) India has never faced linguistic conflicts.
2) Women are not susceptible to violence.
3) Every caste or sub-caste insists that its members should marry within the group.
4) India is a not sovereign country.
5) Regional parties have started playing an important role in national politics.
6) Tribal population is found in the urban areas.
7) The Indian constitution uses the term mother tongue instead of language or dialect.
8) A caste is 'dominant' when it wields Economic and political power.

(मराठी रूपांतर)

एकूण गुण : ७५

वेळ: २ ½ तास

सूचना : १) सर्व प्रश्न अनिवार्य आहेत.

२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

३) आवश्यक वाटल्यास इंग्रजी प्रश्नपत्रिका पहावी.

प्रश्न १ (अ) योग्य पर्याय निवडा (कोणतेही आठ) ०८

१) महाराष्ट्र राज्याची ------ भाषा ही एकमेव अधिकृत भाषा म्हणून आठव्या अनुसूचीमध्ये सूचीबद्ध आहे.
(हिंदी, कोकणी, मराठी)

२) ----- मध्ये दूरदृष्टी असते परंतु कमी दृष्टी नसते.
(हायपरमेट्रोपिया, मायोपिया, ,ओनोमेटोपोइआ)

३) ..... भारतामध्ये हिंदी भाषा विरोधी आंदोलने झाली.
(उत्तर, दक्षिण, पाश्चात्य)

४) मानवी हक्कांच्या सार्वत्रिक जाहीरनाम्याचे अनुच्छेद 29(A), UN ने ..... मध्ये स्वीकारले.
(1905, 1948, 1991)

५) पहिल्या महिला राजदूत ----- होय.
(विजया लक्ष्मी पंडित, सरोजिनी नायडू, सावित्रीबाई फुले)

६) संविधानाच्या आठ अनुसूचीमध्ये ..... अधिकृत भाषा आहेत.
(21, 22, 24)

७) भारतात ------ राज्यात सर्वात कमी लिंग गुणोत्तर आहे.
(राजस्थान, हरियाणा, पंजाब)

८) ..... सीमा विवाद हा कर्नाटक आणि महाराष्ट्र या भारतातील राज्यांचा समावेश असलेला वाद आहे.
(बेळगाव, सांगली, पुणे)

९) अधिकार आणि कर्तव्ये ---- संज्ञा आहेत.
(विरुद्ध ,परस्परसंबंधित ,असंबंधित)

१०) राजीव गांधी सरकारने पंचायती राज व्यवस्थेचे पुनरुज्जीवन करण्यासाठी 1989 मध्ये संसदेत ..... घटनादुरुस्ती सादर केली.
(64, 73, 74)

(ब) खालील विधाने चूक की बरोबर आहेत ते सांगा (कोणतेही सात) ०७

१) भारताला कधीही भाषिक संघर्षांचा सामना करावा लागला नाही.

२) महिला हिंसाचाराला बळी पडत नाहीत.

३) प्रत्येक जात किंवा पोटजाती आपल्या सदस्यांनी समूहातच विवाह करावा असा आग्रह धरतो.

४) भारत हा सार्वभौम देश नाही.

५) प्रादेशिक पक्ष राष्ट्रीय राजकारणात महत्त्वाची भूमिका बजावू लागले आहेत.

६) आदिवासी लोकसंख्या शहरी भागात आढळते.

७) भारतीय राज्यघटनेत भाषा किंवा बोली ऐवजी मातृभाषा हा शब्द वापरला आहे.

८) जेव्हा जात आर्थिक आणि राजकीय सत्ता सांभाळते तेव्हा ती 'प्रबळ' असते.

९) प्रस्तावनेत विचार, अभिव्यक्ती, श्रद्धा आणि उपासना यांच्या स्वातंत्र्याचाही उल्लेख आहे.

१०) सरोजिनी नायडू यांनी काँग्रेस आणि मुस्लिम लीगसोबत काम केले.

प्रश्न २ ग्रामीण समुदाय (rural community) म्हणजे काय? त्याची वैशिष्ट्ये स्पष्ट करा. १५

किंवा

प्रश्न २ देशातील अपंगांना भेडसावणाऱ्या विविध समस्यांचे स्पष्टीकरण द्या. १५

प्रश्न ३ भारतातील महिला अत्याचारांची कारणे आणि परिणाम स्पष्ट करा. १५

किंवा

प्रश्न ३ भारतातील प्रादेशिकवादाची विविध कारणे लिहा. १५

प्रश्न ४ भारतीय राज्यघटनेची वैशिष्ट्य स्पष्ट करा. १५

किंवा

प्रश्न ४ भारतीय नागरिकांच्या मूलभूत कर्तव्याचे वर्णन करा. १५

प्रश्न ५ भारतातील पंचायत राज ही संकल्पना स्पष्ट करा. १५

किंवा

प्रश्न ५ टीपा लिहा (कोणत्याही तीन) १५

अ) बहुसांस्कृतिक समाज

ब) भारतातील भाषिक कलह

क) सहिष्णुता

ड) 73 व्या घटनादुरुस्तीची प्रमुख वैशिष्ट्ये

ई) भारतातील पक्ष पद्धतीतील त्रुटी

Q.1 Fill in the blanks (Any Eight)

A)

1 ------has been marked as 'Kargil Vijay Diwaas' in India

2 When rifle is to be said to be 'loaded' when there is a ---------- in the chamber

3 The word of command for Dressing is ----------

4 In 'Slow March' the number of paces per minute ---------- .

5 There are ----- types of drill.

6 Head quarters of Maharashtra Directorates is in --------

7 Indian first sena chief -------

8 Mazzle velocity of .22 rifle is ---------- .

9 Captain VikramBatra was often referred as ---------- in the intercepted messages of the Pakistan Army.

10 Deepa Malik made a new record in ---------- game. 07

Q.1 B) State the following sentences are true or false.(Any seven).

1) Angle between both heels in Savdhan position is 50 degrees.

2) 'Tejchal' starts from left foot .

3) We turn ----- degree in Peeche Mur'.

4) When you have finish your firing you should wait for the next order.

5) COC means centrally Organised camps.

6) The weight of 7.62 mm SLR is 5 kg.

7) Magazine capacity of .22 rifle is 10 round.

8) Drill does not develops obedience in cadets.

9) PanditHridaynathkunjaru was the president of NCC Committee in 1946.

10) Para sailing is not adventure activity.

Q2 . Answer the following .

1) Explain the structure and organization of National Cadet Crops. 07

2) Discuss the significant role played by national heroes in freedom movement . 08

OR

1) List the duties and responsibilities of NCC cadets. 07

2) What are the main features of EBSB Camp. 08

Q.3 Answer the following .

1) Name the 10 Parts of 7.62 mm S.L.R. 07

2) What is the importance of national unity? 08

OR

1) What are the rules of Drill? 07

2) Write full NCC song . 08

Q.4 Answer the following .

1) List the word of command used in a Drill. 07

2) Write a note on Field Marshal Manekshaw. 08

OR

1) What are the stress management techniques . 07

2) Explain the various Rank in Army ,Navy and Air force 08

Q.5 Answer the following .

1) What are the guidelines for effective listening. 07

2) Define motivation? Explain the factors which helps in motivating any person. 08

OR

1) What point should kept in to mind to improve public speaking skills? 07

2) What are the various types of groups? 08

प्रश्न रिक्त जागा योग्य शब्द लिहून भरा. (कोणतेही आठ)

क्र. १अ

१ ---------- रोजी जागतिक एड्स दिन साजरा करण्यात येतो.
२ राष्ट्रपतींच्या गार्ड ऑफ ऑनरमध्ये ---------- जवान असतात.
३ .22 रायफल साफ करण्यासाठी वापरण्यात येणाऱ्या कापडाचा आकार ---------- आहे.
४ ---------- क्रिया तणाव कमी करण्यास व तणावास प्रतिबंध करण्यास मदत करू शकतात.
५ माणसाला प्रेरित करण्यासाठी ---------- घटक असतात.
६ ---------- हा आदेश परेडच्या शेवटी दिला जातो.
७ मुख्य पॅरासेलिंग उपकरण ---------- आहे.
८ महाराष्ट्र संचालनालय ---------- येथे स्थित आहे.
९ GST म्हणजे ----------.
१० सर्वोच्च गैर शौर्य पुरस्कार ---------- आहे. ०७

प्रश्न खालील वाक्य चूक कि बरोबर ते सांगा. (कोणतेही सात).

क्र. १ ब

१ साठवलेले पाणी पिण्यासाठी वापरता येते.
२ दौड के चलमध्ये वेग १८० पावले प्रति मिनिट आहे.
३ महाराणा प्रताप हे हल्दीघाटीचे राजे होते.
४ सौर उर्जे चा वापर बॅटरी चार्ज करण्यासाठी केला जातो.
५ सर्व सभ्यतांचा अभ्यास हा इतिहासाचाच एक भाग आहे.
६ 'वाय-फाय' नेटवर्क चा वापर तुम्ही मर्यादेसह करू शकता कारण ते तुम्हाला जगभर कनेक्ट करू शकत नाही.
७ संवादाचा अभाव आपल्या नात्यात समस्या निर्माण करतो.
८ शाब्दिक संवाद म्हणजे शब्दांशिवाय संवाद.
९ सावध स्थिती मध्ये दोन्ही टाचा मधील कोन ५० अंश आहे.
१० 'भारत छोडो आंदोलनाची सुरुवात मुंबईतून झाली.

प्रश्न क्र. २ खालील प्रश्नांची उत्तरे सविस्तर लिहा.

१ राष्ट्रीय कॅडेट कोर ची रचना आणि संघटना स्पष्ट करा. ०७
२ स्वातंत्र्य चळवळीत राष्ट्रीय वीरांनी बजावलेल्या महत्त्वपूर्ण भूमिकेची चर्चा करा. ०८

किंवा

१ ड्रिलचे नियम काय आहेत? ०७
२ पूर्ण NCC गाणे लिहा ०८

प्रश्न क्र. ३ खालील प्रश्नांची उत्तरे सविस्तर लिहा.

१ 7.62mm MMG ची मुख्य वैशिष्ट्ये काय आहेत ०७
२ कोणत्याही राष्ट्राच्या प्रगतीसाठी राष्ट्रीय एकात्मता महत्त्वाची का असते? ०८

किंवा

१ Rif[illegible] साठी लेइंग पोलिशनमध्ये लोडिंग आणि अनलोडिंगसाठी ड्रिल काय आहे? ०७

२ राष्ट्र उभारणीसाठी युवक वैयक्तिकरित्या कसे योगदान देऊ शकतात. ०८

प्रश्न क्र. ४ खालील प्रश्नांची उत्तरे सविस्तर लिहा .

१ ड्रिलमध्ये वापरलेल्या कमांडच्या (सूचना) शब्दाची यादी करा. ०७

२ फिल्ड मार्शल सर मानिक्शोव यांच्या वर टीप लिहा. ०८

किंवा

१ माइंडसेट म्हणजे काय? ०७

२ आर्मी, नेव्ही आणि एअर फोर्समधील विविध पदांचे स्पष्टीकरण करा ०८

प्रश्न क्र. ५ खालील प्रश्नांची उत्तरे सविस्तर लिहा .

१ कारगिल संघर्षावर एक छोटी टीप लिहा. ०७

२ रेन वॉटर हार्वेस्टिंगवर एक छोटी टीप लिहा. ०८

किंवा

१ प्रभावी ऐकण्यासाठी मार्गदर्शक तत्त्वे काय आहेत. ०७

२ प्रेरणा परिभाषित करा? कोणत्याही व्यक्तीला प्रेरणा देण्यास मदत करणारे घटक स्पष्ट करा. ०८

D B J college, Chiplun
ATKT Exam March 2024
Sem I
FYBSc
Sub: Zoology I

FYBSC Zoo
4/3/24

Time: Three hours. **Marks: 100**

N. B. 1) All questions are **compulsory.**
2) All questions carry **equal marks.**
3) **Draw** neat labeled **diagrams** wherever **necessary**.

Q. 1. A) Fill in the blanks by choosing the correct option given in the bracket. 05

a) In Darwin's frog .....exhibit parental care.
(male and female, male, female)
b) .....is a typical desert Reptile.
(Kangaroo rat, Phrynosoma, Camel)
c) The first practical work to produce artificial pearls was done by the.....
(Japanese, Chinese, Indians)
d) Silent Valley National park is located in.....
(Tamilnadu, Kerala, Karnataka)
e) 'My Village My Pilgrimage" is autobiography of-
(Dr. Varghese Kurian, Dr. Salim Ali, Anna Hazare)

Q. 1. B) Match the columns I and II and rewrite. 05

Column I	Column II
1) Batesian mimicry	a) Maldives
2) Atoll	b) ex-situ conservation
3) Dissipating heat	c) Grain Bank
4) Gene bank	d) Desert adaptation
5) Anna Hazare	e) Great Eggfly

Q. 1. C) State whether True or False. 05

a) Birds use echolocation for capturing their prey.
b) Wall lizard does not show considerable power of regeneration.
c) Marsupials are pouched mammals.
d) Anna Hazare was popularly known as Birdman of India.
e) Endemism is not occurring in the biodiversity hotspots.

Q. 1. D) Answer the following in one sentence only. 05

a) Define the bioluminescence.
b) Name any two types of *in-situ* conservation techniques.
c) Give full form of WCMC.
d) What is species diversity?
e) Give two names of surimi based value added products.

(P.T.O.)

Q. 2. A) Describe the types of bird migration and add note on navigation in birds. 10

OR

A) Describe the adaptive features in desert animals with suitable example. 10

Q. 2. B) Write short notes on (any two) 10

a) Parental care in Amphibians.

b) Regeneration in animals.

c) Brood parasitism with suitable example.

d) Echolocation in Dolphins.

Q. 3. A) What is biodiversity? Give an account on threats to biodiversity. 10

OR

A) State the direct and indirect use values of biodiversity. 10

Q. 3. B) Write short notes on (any two) 10

a) Man-wildlife conflict.

b) Convention on Biological Diversity.

c) Indian Wildlife Act 1972.

d) Indo-Burma hotspot.

Q. 4) Answer any two of the following 20

a) Describe in detail account on Dr. Salim Ali.

b) Give a detailed account on Amul White revolution.

c) Describe the life sketch and achievements of Dr. Hargobind Khorana.

d) Describe the work of water conservation by Anna Hazare.

Q. 5) Write short notes on (any four) 20

a) Types of corals reefs.

b) Parental care in fishes.

c) National parks.

d) Significance of Biodiversity.

e) Anandvan.

f) BIOCON.

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D.B.J. College, Chiplun
ATKT Exam March 2024

FYBSC maths
4/3/24

Sem I
FYBSC
Sub Maths I

Time: 02.30 hours | Total Marks: 75

Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.
3) Use of calculator is not allowed.

Q.1 A) Attempt any one questions of the following. **(8)**

a) State and prove Hausdorff property.

b) State and prove Cauchy Schwartz Inequality.

B) Attempt any two questions of the following. **(12)**

a) Show that $\frac{|a+b|}{1+|a+b|} \leq \frac{|a|}{1+|a|} + \frac{|b|}{1+|b|}$ for any real number a and b.

b) If $a = -1$ & $b = 1$ then find disjoint neighbourhoods of a and b.

c) Prove that multiplicative identity is unique.

Q.2 A) Attempt any one questions of the following. **(8)**

a) State and prove Sandwich theorem.

b) Prove that limit of convergent sequence in unique.

B) Attempt any two questions of the following. **(12)**

a) Find limiting value of the sequence $a_n = \frac{3\sqrt{n}-7}{8+\sqrt{n}}$.

b) If $a_n = \frac{(-1)^n \cos\left(\frac{n\pi}{2}\right)+1}{n^2}$ then find first 6 terms of the sequence.

c) Show that the sequence $a_n = \frac{3n+1}{4^n}$ is monotonic decreasing sequence.

Q.3 A) Attempt any one questions of the following. **(8)**

a) Prove that every convergent sequence is Cauchy.

b) Prove that every Cauchy sequence is bounded.

B) Attempt any two questions of the following. **(12)**

a) If $f(x) = \sqrt{10-x}$, find domain, codomain and range of f.

b) Draw the graph of the function $y = |2x+4|$.

c) If $f: [-3, 2] \to \mathbb{R}$ is defined as $f(x) = -3x + 5$, find the range of f.

Q.4 Attempt any three questions of the following. **(15)**

a) Let a, b, c$\in \mathbb{R}, a \neq 0$, then prove that $a.b = a.c \Rightarrow b = c$.

b) Using Sandwich theorem, prove that $a_n = \frac{(-1)^n}{n}$ is convergent.

c) Check whether the function $f(x) = -7x + 2$ is increasing or decreasing.

d) Using monotone convergence theorem prove that,
$a_1 = 8,\ a_{n+1} = \frac{1}{2}a_n + 2$ is convergent.

e) Prove that square of non-zero real number is always positive.

****

FYBSc maths
5/3/24

FYBSc
Sub. Maths II

Duration :2.30hrs **Maximum marks:75**

N.B. 1) All questions are compulsory.

2) Figures to right indicates full marks.

3) Use of calculator is not allowed.

Q 1. A] Attempt Any One. **(8)**

i) Define divisibility and congruence of an integers. Also prove that if $a|b$ and $b|c$ then $a|c$, for any $a, b, c \in \mathbb{Z}$.

ii) Prove that, if $a \equiv b \ (mod\ n)$, $c \equiv d \ (mod\ n)$ then $a + c \equiv b + d \ (mod\ n)$ and $ac \equiv bd \ (mod\ n)$, for any $a, b, c, d \in \mathbb{Z}$.

B] Attempt any Two. **(12)**

i) Find g.c.d. of 24 and 138 and express it in the form of $24x + 138y$ for suitable $x, y \in \mathbb{Z}$.

ii) State Wilson's theorem and verify it for $p = 11$.

iii) Evaluate $\emptyset(2625)$.

Q 2. A] Attempt Any One. **(8)**

i) In $\mathbb{Z}$, define a binary operation * as, For $a, b \in \mathbb{Z}$, $a * b = a + b - 4$. Show that * satisfies all the properties of binary operation.

ii) Show that $f: \mathbb{R} - \left\{-\frac{1}{2}\right\} \to \mathbb{R} - \{\frac{3}{2}\}$ defined by $f(x) = \frac{3x-7}{2x+1}$ is bijection and hence find its inverse.

B] Attempt any Two. **(12)**

i) Let $f: \mathbb{R} \to \mathbb{R}, f(x) = logx$ and $g: \mathbb{R} \to \mathbb{R}, g(x) = e^x$ .Then, Find $(fog)(x)$, $(gof)(x)$, $(gog)(x)$, (fof)(x).

ii) Let $a * b = a + 2b$, for $a, b \in \mathbb{Z}$. Test whether given binary operation * is commutative and associative.

iii) Any two equivalence classes of X are either disjoint or identical.

Q 3. A] Attempt Any One. **(8)**

i) State and prove Remainder theorem.

ii) State and prove Rational Root theorem.

B] Attempt any Two. **(12)**

i) Find Multiplicity of each root of $f(x) = x^4 - x^3 - 3x^2 + 5x - 2$.

ii) Find quotient and the remainder when $f(x) = x^5 + 2x^4 - 3x^2 + 4x + 2$ is divided by $g(x) = x^2 + 2$.

iii) Find g.c.d. of the polynomials $f(x) = x^8 - 1, g(x) = x^6 - 1$ over $\mathbb{R}[x]$.

Q.4 Attempt any three of the following. (15)

i) Find a polynomial whose roots are $2, -2, -3, -1$

ii) Use mathematical induction to prove that,

$$1 + 2 + 3 \ldots + n = \frac{n(n+1)}{2}, \forall n \in \mathbb{N}.$$

iii) Is 2023 and 2024 are co-prime? Justify your answer.

iv) Expand $(x + y)^5$ by using Pascal's triangle and hence find the value of $(x + 2)^5$.

v) Calculate the number of integers less than or equal to 400 and that are relatively prime to 400.

FYBSc 200
5/3/24

NB: 1. All the questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw neat labeled diagrams wherever necessary.

Q. 1 A) Choose appropriate answer and rewrite the sentence. 05

i) Flash point of acetone is .....
(-16.5°C, 17.8°C, 37.8°C, 70°C)

ii) For the study of population of drug addicts and AIDs patients ..... sampling method is preferred.
(Quota, Judgmental, Snowball, Convenience)

iii) Graphical presentation of frequency and corresponding class intervals is called..... (Simple bar diagram, Multiple bar diagram, Histogram, Pie diagram)

iv) .....are used to create transgenic fishes with enhanced resistance to cold temperature.
(Growth hormones, Antifreeze proteins, Glycoproteins, Amino acids)

v) In paper chromatography.:.....works as a mobile phase.
(Paper, Organic solvent, Inorganic solvent, Water)

Q. 1 B) State whether the following statements are true or false. 05

a) Solutes travelling in the mobile phase do not interact with the stationary phase.

b) Absorption spectrophotometry deals with the interaction of electromagnetic radiation with the substance.

c) Martin Chalfie, Osamu Shimomura and Roger Tsien were awarded the 2008 Nobel Prize for the discovery of the green fluorescent protein.

d) Recombinant rennin is called chimeric chymosin.

e) The ability of microscope to distinguish between separations of smaller objects within the object being studied is called its Resolving Power.

Q. 1 C) Define the following terms. 05

i) Acidosis
ii) Data
iii) Gene therapy
iv) Forensic science
v) Mode

Q. 1 D) Match the following columns and rewrite. 05

Column I	Column II
Fahrenheit scale	Oxidizing agent
Colorimeter	DNA Analysis
Bromine	Gabriel Daniel
Bkm	Optical density
PAGE	Dr. Lalji Singh

Q. 2 A) With Reference to safety symbols describe toxic substances and corrosive substances used in laboratory. **10**

OR

(P.T.O.)

Q. 2 A) Define median. By using following data on the height of students in inches of 05

i) F.Y.B.Sc. class, calculate median.

34, 36, 38, 39, 72, 66, 64, 60, 40, 42, 51, 54, 48.

ii) By using the following data on exports of fishes in tones, develop multiple bar diagram. 05

Year	USA	China
2010	52	60
2011	48	72
2012	34	44
2013	24	36

Q. 2 B) Attempt any TWO of the following. 10

i) Write any five safety laboratory measures.

ii) What is sampling? Comment on simple random sampling.

iii) Enlist the characteristics of solution.

iv) With the suitable pictogram describe aspiration hazards.

Q. 3 A). With suitable example explain the role of Aqua Bounty Technology in the development of transgenic fish. 10

OR

Q. 3 A) Define transgenesis and comment on nuclear transplantation method of transgenesis. 10

Q. 3 B) Attempt any TWO of the following. 10

i) Briefly explain the DNA fingerprinting technique.

ii) Comment on the use of recombinant DNA technology in production of human insulin.

iii) With suitable example explain the ex vivo gene therapy.

iv) Describe the industrial applications of biotechnology.

Q. 4) Attempt Any TWO of the following. 20

i) Describe principle of electrophoresis and enlist applications of gel electrophoresis.

ii) Discuss principle and applications of chromatography.

iii) Discuss principle and applications of pH meter.

iv) Draw a labeled diagram of compound microscope and describe its parts.

Q. 5) Write short notes on any FOUR. 20

i) Explosives

ii) Histogram

iii) Dolly

iv) Green genes

v) Dissecting microscope

vi) Paper chromatography

D.B.J College, Chiplun
ATKT Exam March 2024 Sem I
FYBSC
Sub: Chemistry I

FYBSC.Che
6/3/24

Duration: 2 ½ hrs. **Marks: 75**

Please check whether you have got the right question paper.

N.B. : 1. All questions are compulsory.
2. Answers to the same questions must be written together.
3. Figures to the right indicate full marks.
4. The use of log table/ non programmable calculator is allowed.

Q.1 A Select the correct option and complete the following sentences. (**Attempt any nine**) 9

i) Which of the following is a state function?
a) Internal Energy b) Heat c) Work

ii) In isobaric process,.....of system remains constant.
a) Temperature b) Pressure c) Volume

iii) 50 mL of 0.1N solution of HNO_3 contains ..... milliequivalents.
a) 0.05 b) 50 c) 5

iv) Number of moles corresponding to 54 g of water is.....
a) 2 b) 3 c) 4

v) Number of radial nodes for 3d orbital is.....
a) Zero b) 1 c) 2

vi) The subshell with *l* value zero is designated as .....
a) s b) p c) d

vii) The first period has only ..... elements.
a) 2 b) 4 c) 1

viii) In ground state of atom electron occupies .....energy orbital available to them.
a) highest b) lowest c) middle

ix) IUPAC name of malonic acid is -------.
a) Ethanedioic acid b) Propanedioic acid c) Propanoic aci

x) Percentage of s-character in sp^3 hybridized carbon is ---------.
a) 50 b) 75 c) 25

xi) The correct order of reactivity among the following is.....
a) ethane >ethene>ethyne
b) ethane >ethyne>ethene
c) ethyne>ethene> ethane

xii) The Shape of the carbocation is -------.
a) Linear b) Pyramidal c) Trigonal Planar

xiii) The stability of carbanion ---------- by increase in % of 's' character at carbanion carbon.
a) decreases b) increases c) remains same

B State whether the following sentences are **true** or **false.** (**Attempt any three**) 3

i) Molar entropy is an extensive property.
ii) Molality is independent of temperature.
iii) Sodium is representative element of alkaline earth metals.
iv) Splitting of spectral lines under the influence of electric field is called Zeeman effect
v) Sigma bonds are stronger than pi-bonds.
vi) Phenol is more acidic than acetic acid.

C Match the following (**Attempt any three**)

1) Intensive property	a)R-NH_2
2) Electron	b) IR
3) Pfund series	c) Negative charge
4) Acid Halide	d) Density
5) Nucleophile	e) $AlCl_3$
	f) R-CO-X
	g) Entropy

Q.2 Attempt **any four** of the following

A State first law of thermodynamics. What are its limitations?

B Define enthalpy of combustion. Explain one of its applications.

C Explain the terms- i) Internal Energy ii) Resonance energy

D Three moles of an ideal gas (C_v=20.92 $JK^{-1}mol^{-1}$) at 10 atm and 0°C are converted to 2.0 atm at 50 °C. Calculate ΔE and ΔH for the change. (R=8.314 $JK^{-1}mol^{-1}$)

E Define Formality.
A solution of sulfuric acid (mol.wt=98) contains 4.9 g H_2SO_4 in 400 cm^3. Calculate molarity and normality of solution.

F Find the concentration in ppm and ppb of KCl solution containing 0.002 g in 250 cm^3 of water. Assume density of water is 1g/cm^3.

Q.3 Attempt **any four** of the following

A Explain Rutherford's α-scattering experiment.

B Explain Bohr's atomic model. What are its limitations? (Write any 2)

C Discuss the angular shapes of s & p orbitals.

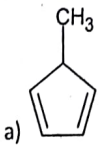
D Explain the term Effective Nuclear charge and calculate Zeff for 2p electron in nitrogen.

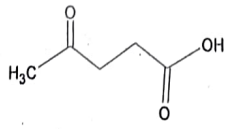
E Explain the formation of cations and anions.
Give reason – Cation is smaller while anion is larger than corresponding atom.

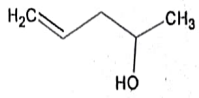
F What is Electronegativity?
Calculate the electronegativity of carbon from the data given below-
E_{H-H} = 104.2 $kcalmol^{-1}$
E_{C-C} = 83.1 $kcalmol^{-1}$
E_{C-H} = 98.0 $kcalmol^{-1}$
X_H = 2.1

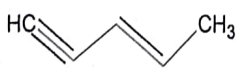
Q.4 Attempt **any four** of the following

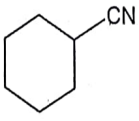
A Give IUPAC names for the following compounds.

a) 

b) 

c) 

d) 

e) 

FYBSc
11/3/24

Duration: 2 ½ hrs. Marks: 75

Please check whether you have got the right question paper.

N.B. : 1. All questions are compulsory.
2. Answers to the same questions must be written together.
3. Figures to the right indicate full marks.
4. The use of log table/ non programmable calculator is allowed.

Q.1 A Select the correct option and complete the following sentences. 9
(Attempt any nine)

i) Which of the following is a rate law for third order reaction?
a) Rate = $k[A]^2[B]^2$ b) Rate = $k[A][B]^2$ c) Rate = $k[A]^3[B]^3$

ii) Half time of first order reaction is ……. to initial concentration of reactants.
a) directly proportional b) inversely proportional c) independent

iii) Viscosity coefficient is expressed in unit……..
a) $Ns^{-1}m^2$ b) Nsm^{-2} c) Nsm^2

iv) Critical angle phenomena takes place in……
a) Viscometer b) Stalagmometer c) Refractometer

v) Oxidation state of nitrogen in HNO_3 is
a) +3 b) +5 c) -5

vi) The tendency of an element to form a long chain of same atom is called
a) Catenation b) Chain Formation c) Metallation

vii) The damage of Taj Mahal is caused by
a) Sulfur b) Carbon c) Tin

viii) ----- is major sink for removal of CO from the air.
a) Plant b) Microorganism c) Animal

ix) In flying-wedge formula, a solid wedge represents a bond projecting -----
a) above the plane of the paper b) below the plane of the paper
c) in the plane of the paper

x) Lactic acid has ------- optical isomers.
a) Three b) four c) two

xi) ----------is optically active.
a) Glyceraldehyde b) Erythro-2,3-dichlorobutane
c) meso- tartaric acid

xii) According to CIP rules the correct priority order of the following is ------
a) Br > F > Cl > H b) Br > Cl > F > H c) Br > F > H > Cl

xiii) The main condition for optical activity is ----------.
a) Presence of chiral centre b) molecular dissymmetry
c) presence of symmetry element

B State whether the following sentences are **true** or **false. (Attempt any three)** 3

i) During kinetic study of chemical reaction, temperature is maintained constant.
ii) Rain drops are spherical in shape because of viscosity.
iii) Sodium bicarbonate is aerating agent.
iv) Carbon is most electropositive element.
v) Fischer projection formula represents staggered conformation.
vi) Meso form of 2,3-dichlorobutane is optically active.

C Match the following (**Attempt any three**) 3

i)	$k = Ae^{-Ea/RT}$	a) $CaCO_3$
ii)	Lime stone	b) Staggered form
iii)	Caustic soda	c) Arrhenius equation
iv)	2-Bromopropane	d) NaOH
v)	Antiperiplanar	e) Snell's law
		f) CaO
		g) Optically inactive

Q.2 Attempt **any four** of the following 20

A Derive integrated rate equation for first order reaction.

B Name the methods used to determine order of reaction. Explain any one in detail.

C In second order reaction with two reactants is started with 0.01 mol/dm^3 concentration of both reactants. It is 10% complete in 1800 seconds. Calculate i) the rate constant ii) time taken by reaction to be 40% complete.

D What are liquid crystals? Explain nematic and smectic liquid crystals with examples.

E Explain the method used for determination of surface tension by stalagmometer.

F The refractive index of certain compound is 1.4425 and its density is 1.5888×10^3 kg/m^3. Calculate its molar refractivity. (mol.wt of compound is 153)

Q.3 Attempt **any four** of the following 20

A What is diagonal relationship between elements? Explain it with respect to beryllium and aluminium.

B With refference to Calcium oxide,
a) Method of preparation (any one)
b) Properties (any two)
c) Uses (any two)

C Name any two oxides of carbon.
Write any two sources and control measures for each oxides of carbon.

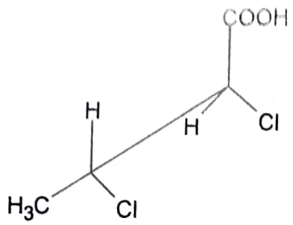
D Write short note on Photochemical smog.

E Descibe any two methods of preparation of hydroxides of Group I and any three uses of it.

F What are carbides? How are alkali metal carbides prepared?

Q.4 Attempt **any four** of the following 20

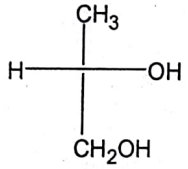
A Draw Fischer projection formulae and Newman projection formulae of erythro-tartaric acid.
Convert the following structure to Fischer projection.



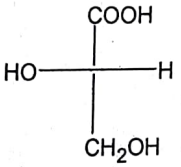
B i)What is stereoisomerism? Explain geometrical isomerism with suitable examples.

ii) Assign 'D' or 'L' configuration to the following compounds.

a)

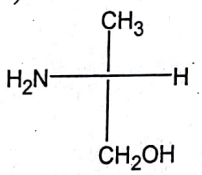


b)

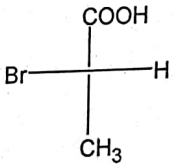


C Assign the configuration 'R' or 'S' to the following molecules by mentioning the priority of substituents.

a)



b)



D What is optical activity? Which of the following compounds are optically active or inactive? Justify your answer.

i) 2-Chlorobutane ii) 3-Chloropentane

Explain the term chirality with example.

E Explain the following terms with suitable examples.

i) Enantiomers ii) Racemic mixture

Write any two characteristics of meso isomers.

F What is conformational analysis? Draw the conformations of ethane. Explain their relative stabilities.

D.B.J. College, Chiplun
ATKT Exam March 2024
Sem I
F YB.Sc.

FYBSc
12/3/24

Sub. Physics Paper I

[Time: 2 ½ Hours] [Marks: 75]

N. B.: (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.
(3) Draw **neat labeled** diagrams wherever **necessary**.
(4) Symbols have usual meaning unless otherwise stated.
(5) Use of **non-programmable** calculator is allowed.

Q. 1 (A) **Attempt ANY ONE.** **10**

(i) Explain the steps in solving problems using Newton's laws.

(ii) Two masses of 2 kg and 4 kg are hung and connected by a string passing over a pulley. Calculate the acceleration of each mass and the tension in the string

(B) **Attempt ANY TWO.** **10**

(i) Two blocks of masses 10 kg and 8 kg are connected by a light string which passes over a smooth pulley. Calculate the acceleration of each mass and the tension in the string.

(ii) An elevator is accelerating downwards with the acceleration of 2.8 m/s^2. A person standing on the scale fitted on the floor of an elevator reads his weight as 480 N. What will be his weight when the elevator comes to rest?

(iii) What are conservative and non-conservative forces? Show that gravitational force is conservative force.

(iv) A woman 500 N stands up on a scale containing stiff spring. In equilibrium the spring is compressed by 1 cm under her weight. Find the force constant of the spring and the total work done on it during compression.

Q. 2 (A) **Attempt ANY ONE.** **10**

(i) Show that for a homogeneous isotropic material $Y = 3K(1 - 2\sigma)$.

(ii) State and prove Bernoulli's theorem for the streamline flow.

(B) **Attempt ANY TWO.** **10**

(i) A horizontal pipe has non-uniform cross-sectional area. The velocity of flow is 0.35 m/s at pressure 2 cm of mercury. Calculate the pressure at a point where the velocity is 0.67 m/s.

(ii) For isotropic homogeneous material, show that; $\frac{9}{Y} = \frac{1}{K} + \frac{3}{\eta}$.

(iii) State and explain Stoke's law.

(iv) Calculate the rate of flow of water through the horizontally kept capillary tube of length 100 cm and internal diameter of 1 mm, under pressure of a water column of water 40 cm in height. (viscosity of water = 10^{-3} Ns/m^2)

Q. 3 (A) Attempt ANY ONE. 10

(i) Derive an expression for the work done by a perfect gas in an adiabatic change. Hence show that; $W = C_v (T_1 - T_2)$.

(ii) Derive an expression for the efficiency of Carnot's engine.

Q.3 (B) Attempt ANY TWO. 10

(i) Find the equation of the curve passing through maxima and minima of Van der Waal's isothermals.

(ii) The critical volume of hydrogen is 37.6 cc/g. Calculate the molecular diameter of hydrogen. $N = 6.023 \times 10^{23}$ per mole.

(iii) An ideal gas of volume 1.0 L is compressed adiabatically to $(1/15)^{th}$ of its initial volume. At $27^{o}C$ its initial pressure is 1.01×10^{5} Pa. Calculate **(i)** final pressure and **(ii)** final temperature. (For ideal gas $\gamma = 1.4$).

(iv) Explain the concept of heat.

Q. 4 Attempt ANY FIVE. 20

(i) In the following situations, state whether a net force is acting on the body or not:

1. A box placed on a horizontal table
2. A comet orbiting the Sun
3. A car moving with constant speed on a curved road
4. A ball free- falling through air
5. A disc hung by a string attached to the ceiling

(ii) A block of mass m is placed on a horizontal surface for which the coefficient of friction is μ. Find the force F required to be applied to the block to get it just started if (i) F is below the horizontal making angle θ with the vertical, (ii) F is above the horizontal making angle θ with the vertical. Which is advantageous?

(iii) Derive equation of continuity.

(iv) A metal wire of length l and radius r is stretched. Assuming that the volume of the wire is unchanged, show that Poisson's ratio of the material is 0.5.

(v) A reversible Carnot cycle does work which is equal to 150 KJ/cycle. At 227 ^{o}C, the heat supplied by cycle is 225 KJ/cycle. Calculate the temperature at which heat is rejected, and thermal efficiency of engine.

(vi) In a double acting steam engine, the average pressure of steam is 1.2×10^{5} N/m^2. The length of a stroke is 1 m and the area of the piston is 0.15 m^2. Find the power of the engine if it makes 4 strokes per second.

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D.B.J College, Chiplun
ATKT Exam March, 2024
Sem I
FYBSC.
Sub: Physics II

FYBSC
13/3/24

Total Marks: 75 **Duration: 2 hrs 30 min**

N.B: (1) All questions are compulsory. (2) Figures to the right indicate full marks.

(3) Draw neat diagram wherever necessary.(4) Symbols have usual meaning unless otherwise stated.

Physical Constants:

(1) Speed of Light, $C = 3 \times 10^8$ m/s (2) Planck's Constant, $h = 6.63 \times 10^{-34}$ Js

(3) $e = 1.6 \times 10^{-19}$ C (4) $1\ eV = 1.6 \times 10^{-19}$ joules

(5) Avogadro's Number $= N_o = 6.023 \times 10^{23}$ (6) Mass of Electron $= m_e = 9.11 \times 10^{-31}$ kg

(7) Mass of Proton $= m_p = 1.67 \times 10^{-27}$ kg (8) Mass of Neutron $= m_n = 1.67 \times 10^{-27}$ kg

Q.1 A] Attempt **any one** of the following. **(10)**

i) Give the brief account of a nuclear compositions: (a) Nuclear size, (b) Nuclear charge.

ii) What is radioactivity? State and explain the law of radioactive disintegration. Derive necessary relation.

B] Attempt **any two** of the following. **(10)**

i) Draw a graph of B. E. / nucleon Vs. atomic mass number. Explain its characteristicfeatures.

ii) What is the ratio of the nuclear magnetron to the Bohr magnetron of the

iii) electron?

iv) What is radioactive equilibrium? Explain ideal equilibrium.

Find the age of an ancient wooden item, if the activity of ^{14}C nuclide in the item amounts to 3/5 of that in lately felled trees. Half-life of ^{14}C nuclei is 5570 years.

Q.2 A] Attempt **any one** of the following. **(10)**

i) Give the classification of nuclear reactions with a suitable example.

ii) Draw a diagram of a G. M. counter. Explain its construction and working.

B] Attempt **any two** of the following. (10)

i) Define threshold energy of nuclear reaction. Obtain an expression for it.

ii) Find the Q-value for reaction $^{16}_{8}O$ (n, d) $^{15}_{7}N$. Is the reaction Exothermic or Endothermic? Why?

(Given: Atomic masses in a.m.u. for Oxygen = 15.9949, Nitrogen = 15.0001, Neutron = 1.008665 and Deuterium = 2.014102.)

iii) Derive necessary relation for Geiger's rule.

iv) A parent nucleus Fluorine (^{19}F) is stationary and is hit by a neutron beam. Thereaction is represented as ^{19}F (n, p) ^{19}O, and has Q-value of the order – 3.9 MeV.If the threshold energy of neutron is 4.105 MeV, calculate the atomic mass ofparent nucleus.(Given: Mass of neutron = 1.008665 a.m.u.)

Q.3 A] Attempt **any one** of the following. (10)

i) Explain the phenomenon of a gravitational red shift. Derive necessary relation.

ii) Discuss Davisson and Germer experiment in detail and explain its importance.

B] Attempt **any two** of the following. (10)

i) Write a short note on wave-particle dualism.

ii) A proton is confined to a nucleus of radius 5×10^{-15} m. Find the minimum uncertainty in its momentum.

iii) Describe single crystal Bragg's spectrometer.

iv) An x-ray tube emits X-rays with minimum wavelength 0.1 A°. What is the operating voltage of the tube?

Q.4 Attempt **any five** of the following. (15)

i) Write a note on (1) Mass defect, (2) Packing fraction.

ii) Write a note on natural radioactivity.

iii) Find the radii of a ^{16}O and ^{208}Pb nucleus. (Use R_o = 1.4 fm.)

iv) Write a note on nuclear fission.

v) Write a note on Bremsstrahlung process.

vi) Write a note on Laue-diffraction.

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