ATKT Exam, Sem-III

SYBA / SYB.Com. / SYBSc

March-2024

SYBSC

ATKT Exam

Sem III

March-2024

D.B.J. College, Chiplun
ATKT Exam March 2024
Sem III
SYBA/Bcom/BSc
Sub: Foundation Course

SYBA/BCom/BSC
2/3/24

Time – 2 ½ hrs. Total Marks – 75

N.B. 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q.1) A) Explain the following concepts. (Any five) 15

1) Schedules castes.
2) Right against Exploitation.
3) Human rights of person with disabilities.
4) Disaster.
5) Classical era.
6) Prejudices
7) Self-awareness
8) Group Discussion

OR

B) Discuss in detail on the Foundation Course (semester –III) project submitted by you. 15

Q.2) A) In what ways do the human rights of women violate?

OR

B) Explain the Fundamental Rights of Indian citizens.

Q.3) A) Explain the Economic and Social effects of disasters. 15

OR

B) Discuss in detail the flood of Maharashtra in 2005.

Q.4) A) State the contribution of any four scientists towards the growth of science during the period of the 'Renaissance'. 15

OR

B) State the importance of technology in the modern era.

Q.5) A) Discuss the Advantages and Disadvantages of written communication. 15

OR

B) Comment on 'Team Building' and 'Effective Listening;

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मराठी रुपांतर

एकूण गुण ७५ वेळ - २ तास ३० मिनिटे

सूचना - १) सर्व प्रश्न अनिवार्य आहेत.

२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

प्र.१) अ) खालील संकलपना स्पष्ट करा. (कोणत्याही पाच) १५

१) अनुसूचित जाती

२) शोषणा विरुद्धचा हक्क

३) अपंग व्यक्तिचा मानवी हक्क

४) आपत्ती

५) पारंपरिक कालखंड

६) पूर्वगृह

७) स्वयं जाणीव

८) गट चर्चा

किंवा

ब) पायाभूत अभ्यासक्रम (सत्र - ३) साठी तुम्ही सादर केलेल्या प्रकल्पावर सविस्तर चर्चा करा.

प्र.२) अ) महिलांच्या मानवी हक्कांचे उल्लंघन कशा प्रकारे केले जाते ते सांगा. १५

किंवा

ब) भारतीय नागरिकांचे मूलभूत अधिकार स्पष्ट करा.

प्र.३) अ) आपत्तीचे आर्थिक आणि सामाजिक परिणाम विशद करा. १५

किंवा

ब) सन २००५ सालच्या महाराष्ट्रातील महापुरावर सविस्तर चर्चा करा.

प्र.४) अ) पुनरुजीवन कालखंडातील कोणत्याही चार शास्त्रज्ञांचे विज्ञानाच्या विकासातील योगदान सांगा. १५

किंवा

ब) आधुनिक काळातील तंत्रज्ञानाचे महत्त्व सांगा.

प्र.५) अ) लेखी संज्ञापनाचे फायदे व तोटे यावर चर्चा करा. १५

किंवा

ब) 'संघ बांधणी' आणि 'प्रभावी श्रवण' यांवर भाष्य करा.

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SYBSc 200
4/3/24

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) In ----------, many genes at different loci control a single phenotypic character.
(Polygenic inheritance, Coupling, Linkage, Autosomal dominant inheritance)

ii) Phenotypic ratio of 9:3:4 is found in ----------.
(Recessive epistasis, Double dominant epistasis, Double recessive epistasis, Dominant epistasis)

iii). ---------- is not a structure of chromosome.
(Primary constriction, Secondary constriction, Tertiary constriction, Nucleolar organizer)

iv) In Z-DNA the diameter of helix remains ----------.
(18A°, 20A°, 23A°, 30A°)

v) ---------- is not a stop codon.
(UAA, UAG, UGA, AGC)

Q. 1 B) Match the following columns. 05

Column I	Column II
Alanine	Inducer gene A
Polytene chromosome	Women
Free ear lobes	CGA
Barr bodies	Balbiani ring
Lac Y gene	Dominant trait

Q. 1 C) Define the following terms. 05

i. Crossing over
ii. Epistasis
iii. Idiogram
iv. Protonopia
v. Spectroscopy

Q. 1 D) State whether the following statements are **True or False.** 05

i) In polyadenylation process multiple adenine nucleotides are added at the 3' end of RNA transcript.
ii) Mendelian law of segregation is also known as law of impurity of gametes.
iii) The combination of alleles inherited by an individual is called genotype.
iv) RNA primer is necessary for polymerization of new polynucleotide strand.
v) Telomeres do not prevent sticking of ends of chromosome.

Q. 2A) Describe Mendel's monohybrid cross with suitable example. 10

OR

Q. 2 A) Describe various types of linkages using suitable examples. 10

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

i) Draw any ten symbols commonly used in Pedigree Chart.
ii) Discuss the concept of pleiotropy.
iii) Comment on the Rh blood group system in man.
iv) Elaborate the modern concept of genes.

(P.T.O.)

Q. 3 A) Write a note on example describing sex linked inheritance. 10

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

a) Describe this structure of lamp-brush chromosome.
b) Describe the ZZ - ZW mechanism of sex determination.
c) Give the classification of chromosomes based on the position of centromere.
d) What are Y linked genes? Discuss the concept of Y linked inheritance.

Q. 4 A) Describe the Watson and Crick model of DNA. 10

OR

Q.4 A) Describe various types of RNA. 10

Q. 4 B) Attempt **any TWO** of the following. 10

i) Elaborate the concept of Operon.
ii) Describe the mechanism of DNA replication.
iii) Enlist the characteristics of the genetic code.
iv) Give this a salient features of A-DNA.

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

1) Haplodipliody
2) Sex reversal
3) ABO blood group system
4) Test cross
5) Transcription
6) Solenoid model of DNA

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SYBSc 200
5/3/24

D.B.J. College, Chiplun
ATKT Exam Mar 2024
Sem III
SYBSc.

Sub. Zoology II

Time: 3 Hrs. **Marks: 100.**

Please check whether you have got the right question paper.

NB: 1. All questions are compulsory and carry equal marks.
2. Figures to the right indicate full marks.
3. Draw neat and labeled diagrams wherever necessary.
4. Attempt the questions in order.

Que.1. **A** **Fill in the blanks by choosing the correct options.** 05

a Organisms that unable to synthesize their own food material and depend on other plants and animals are called .....(Autotrophs, Heterotrophs, Saprophytes)

b Cnidarians possess an internal cavity called.....(Coelom, Spongocoel, Gastro vascular cavity)

c .....animals excrete uric acid as the main end product of nitrogen metabolism. (Uricotelic, Ammonotelic, Ureotelic)

d Presence of air sacs is an important feature of the respiratory system of .....(Birds, Mammals, Amphibians)

e .....have few granules in the cytoplasm that show affinity to acidic dyes.(Eosinophils, Basophils, Neutrophils)

B **Match the column I and II and rewrite.** 05

	Column I		**Column II**
a	Arborescent organ	i	Crustaceans
b	Closed circulation	ii	Planaria
c	Haemocyanin	iii	Sperm
d	Flame cells	iv	*Clarius*
e	Acrosome	v	Earthworm

C **State whether true or false.** 05

a Foregut is also known as proctodaeum.
b The simplest type of excretory system is the septal nephridia.
c Interclavicular air sac is an unpaired air sac.
d Cockroach heart has 03 muscular chambers in abdomen.
e Simple binary fission occurs in Hydra.

D **Define the following.** 05

a Rumen
b Cutaneous respiration
c Plasma
d Galvanotropism
e Spermiogenesis

Que.2. **A** Discuss the digestion in pigeon. 10

OR

A Explain the structure of kidney and uriniferous tubule in human.

	B	**Explain any Two from the following:**	**10**
	a	Formation of food vacuole in Amoeba	
	b	Types of animals based on principal nitrogenous excretory products	
	c	Malpighian tubules in cockroach	
	d	Structure of book lung.	
Que.3.	**A**	Discuss the physiology of respiration in man.	**10**
		OR	
	A	Discuss the types of circulatory fluids.	
	B	**Explain any Two from the following:**	**10**
	a	Respiration in earthworm	
	b	Leucocytes	
	c	Heart of crocodile	
	d	Mechanism of working of heart in man.	
Que.4.	**A**	Describe the types of neurons based on structure and function.	**10**
		OR	
	A	Discuss the structure of male gamete in human.	
	B	**Explain any Two from the following:**	**10**
	a	Synaptic transmission	
	b	Wings of Cockroach	
	c	Gemmule formation in sponge	
	d	Viviparity.	
Que.5.		**Write short notes on any four.**	**20**
	a	Ruminant stomach	
	b	Sol-Gel theory	
	c	Heart of Shark	
	d	Types of fertilization.	

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SYBSC Zoo
6/3/24

D. B. J. College, Chiplun.

ATKT Exam, March 2024

Class: S. Y. B. Sc. **Course Code: USZOE1303** **Subject: Zoology** **Paper: III**

Semester: III **Course: VII** **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) The response to a mother figure is called.....
(habituation, filial imprinting, sexual imprinting)

b) In .....the female langurs allow other females to take care of their offsprings.
(allomothering, allmothering, altruism)

c) Which of the following infects the snail in life cycle of *Fasciola*?
(Cercaria, Redia, Miracidium)

d) Sac brood disease is a.....disease attacking *Apis mellifera* and *Apis cerana* brood.
(viral, bacterial, fungal)

e) .....is a concentrated whole milk product obtained by condensing milk.
(Cheese, Paneer, Khoa)

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

Column I	Column II
1) Habituation	a) Liver fluke
2) Anadromous migration	b) Avian influenza
3) Fascioliasis	c) Scarecrows
4) H5N1	d) Killing pathogenic bacteria
5) Pasteurization	e) Salmon

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

a) Habituation is a learning wherein there is a gradual increase of behavioural response.
b) Classical conditioning is less complex in primates.
c) The infective stage of tapeworm is Cysticercus larva.
d) Biothrax vaccine controls the disease toxoplasmosis.
e) Buffalo milk contains less amount of fat than cow milk.

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

a) What is sexual imprinting?
b) What is catadromous migration in animals?
c) Define biological vector.
d) Write two names of methods in vermiculture.
e) What is paneer?

(P.T.O.)

Q. 2. A) Describe the different types of learned behaviours with suitable example. 10

OR

A) Describe the displacement activities and note on its causes and significance. 10

10

Q. 2. B) Answer any two of the following:

a) Describe the mechanism of communication in ants.

b) Comment on the ritualization in animals.

c) Describe the territorial behaviour in animals.

d) Describe the types of migration in fish with suitable example.

Q. 3. A) Describe the life cycle, pathogenicity and control measures of *Taenia solium*. 10

OR

A) Describe the life cycle, pathogenicity and treatment of *Wuchereria bancrofti*. 10

10

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

a) Parasitic adaptations in endoparasites

b) Morphology of mite.

c) Fascioliasis.

d) Control measures and treatment of amoebiasis.

10

Q. 4. A) Describe the methods of bee keeping and its management.

OR

A) Describe the methods used in vermiculture for production of worms. 10

10

Q. 4) Answer any two of the following:

a) Describe the composition of milk.

b) Give account on the different bacterial diseases of honey bee.

c) Describe the methods of pasteurization of milk.

d) Comment on economic importance of vermiculture.

20

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

a) Types of mimicries in animals.

b) Innate behaviour.

c) Bird flu.

d) Head louse.

e) Pests and enemies of honey bee.

f) Cheese.

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Duration: 2.5 hours Total marks: 75

N. B.

1) All questions are compulsory.
2) Figures to the write indicate full marks.
3) Use of log table / non-programmable calculator is allowed.

Q.1 **Select the correct option and complete the following sentences.** (09)
(Attempt any nine)

A. a) The unit of cell constant is ----------.
i) cm^{-1} ii) $S\ cm^{-1}$ iii) cm^{-2}

b) The sum of transport number of ions is always --------.
i) equal to one ii) less than one iii) greater than one

c) ---------- in the Gibbs free energy change is a measure of network.
i) Increase ii) Decrease iii) Increase followed by decrease

d) Partial molal property is applicable to ---------- system.
i) open ii) closed iii) isolated

e) For spontaneous process ----------.
i) $\Delta G > 0$ ii) $\Delta G < 0$ iii) $\Delta G = 0$

f) In sodium chloride structure both the ions have coordination number.
i) 6:6 ii) 4:4 iii) 8:8

g) In the resonating structures unlike charges should reside over ---------- atoms.
i) central ii) adjacent iii) distant

h) .....hybrid orbitals results from the combination of one s and three p atomic orbitals of valence shell of central atom of a given molecule.
i) sp ii) sp^3 iii) sp^2

i) Bond order in Ne_2 molecule is _____ indicates it is noble gas element.
i) one ii) zero iii) two

j) The rate of SN^1 reaction depends upon -----.
i) non-polar solvent
ii) conc. of alkyl halide
iii) conc. of base

k) Ethyl magnesium bromide reacts with water gives ----------.
i) Ethanol ii) Ethane iii) Butane

l) 2- Methyl propene can be prepared by dehydration of ----------.
i) 2-Propanol ii) 1-Propanol iii) 2-Methyl-2-propanol

m) Aryl ethers are prepared by heating sodium phenoxide with alkyl halide is known as ----------.
i) Fries reaction
ii) Claisen reaction
iii) Williamson synthesis

B. **State whether the following statements are true or false.** (0
(Attempt any three)

a) The degree of dissociation of weak electrolyte is inversely proportional to square root of concentration.

b) For equilibrium process the change in free energy is negative.

c) Higher the resonance energy,greater is the stability of the molecule.

d) In SN^1 reactions there is no inversion of configuration

e) Grignard reagents react with dry ice to form carboxylic acids.

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

	Column A		Column B
a)	Chemical potential	i)	Organometallic compound
b)	Activity of a substance	ii)	Racemic mixture
c)	Sulfur atom in zinc blende structure	iii)	Intensive property of system
d)	Sulfur atom in wurtzite structure	iv)	Speed of cations and anions
e)	Diethyl zinc	v)	f/f^o
		vi)	forms ccp cube lattice
		vii)	forms hcp sub lattice
		viii)	Extensive property of system

20

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

a) Define free energy. Show that, Helmholtz free energy is a measure of maximum work.

b) Define transference number. Discuss its experimental determination by using moving boundary method.

c) Explain, ionic product of water. How will you determine the ionic product of water experimentally?

d) The conductance of 0.1M KCl solution is 12.850 S at 25 ^{0}C. With same conductivity cell the measured conductance of 0.1 M CH_3COOH solution is found to be 0.455×10^{-3} S. Calculate the molar conductance of the CH_3COOH solution.
(Specific conductance of 0.1M KCl = 12.880 S cm^{-1})

e) Derive Gibbs-Helmholtz equation.

f) Define fugacity.
The equilibrium constant for a gaseous reaction is 450 at 95 ^{0}C. Calculate the standard free energy change.
($R = 8.314$ J K^{-1} mol^{-1}) 20

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

a) State the applications of Born-Haber cycle

b) Explain formation of Hydrogen with respect to potential energy curve.

c) Define formal charge. Calculate it for -
i) CO molecule and
ii) N_2O molecule.

d) Define hybridization.
Explain the hybridization and structure of methane.

e) On the basis of valence bond theory, describe the structure of $SiCl_4$.

f) Draw molecular orbital energy level diagram of Nitrogen molecule showing distribution of electrons. Calculate its bond order and state magnetic property. 20

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

a) Explain the mechanism of alkaline hydrolysis of methyl bromide giving energy profile diagram.

b) Explain the following terms with suitable examples.
i) Hydration of alkenes ii) Hydroboration oxidation of alkenes

c) How are the following compounds prepared by using Grignard reagent?
i) 2-Phenyl ethanol ii) 1-Ethyl cyclohexanol
What is the action of following reagents on n-butyl lithium?
i) Acetone ii) Formaldehyde

d) i) Distinguish between SN^1 and SN^2 reactions.

ii) How is ethylene oxide converted into 1-butanol and 3-methyl-1-butanol using suitable Grignard reagent?

e) Explain the following :

i) p-Nitrophenol is more acidic than phenol.

ii) Alcohols are extremely weak acids.

How ethylene oxide prepared from vicinal halohydrins?

f) Write short note on Fries rearrangement of phenolic ester.

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O. B. J. College, Chiplur
S.Y.B.Sc. ATKT examination March 2024
Semester - III
Paper - Chemistry Paper - II

SYBSC chem
9/3/24

Duration: 3 hours

Total marks: 100

N. B. 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of log table / non-programmable calculator is allowed.

Q.1 **Select the correct option and complete the following sentences.**

A. (any twelve) 12

i) The reaction of the type A → B → C is called ---------- reactions.
a) reversible b) consecutive c) parallel

ii) Steam distillation is used for ---------- of organic compound.
a) purification b) separation c) mixing

iii) The correct form of Arrhenius equation is -------.
a) a) $k = A e^{Ea/RT}$ b) $k = A e^{-Ea/RT}$ c) $k = A T e^{Ea/R}$

iv) The liquid mixture which distills with a change in composition is called ---------- mixture.
a) azeotorpic b) zeotropic c) homogenous

v) ---------- step extraction process is more efficient.
a) Single b) double c) multiple

vi) When chemical reaction obeys collision theory probability factor---------.
a) $P = 1$ b) $p < 1$ c) $p > 1$

vii) Tetraborane molecule contain _____ number of 3 centre 2 electron hydrogen bridge bonds.
a) 2 b) 3 c) 4

viii) Borax can be obtained by boiling boric acid with____.
a) Sodium Hydroxide b) Sodium Carbonate c) Sodium acetate

ix) Boron tri haldes are _____in nature and their solutions in organic solvents are bad conductor of electricity.
a) covalent b) ionic c) dimeric

x) Argyrodite is the ore of _____.
a) Germanium b) Silicon c) Tin

xi) Floating zone technique is used for purification of _____
a) Silicon b) Germanium c) Tin

xii) In SiO_2 each Si is covalently bonded with ____ oxygen atoms
a) two b) four c) six

xiii) Enols of β-diketones are stabilized by ----------.
a) solvation b) intermolecular H-bonds c) intramolecular H-bonds

xiv) The formation of cyanohydrin from a ketone is an example of--------
a) electrophilic addition b) nucleophilic addition c) nucleophilic substitution

xv) Reaction of ethyl magnesium iodide with ethyl formate gives ----------.
a) Acetone b) Acetaldehyde c) Propanal

xvi) ---------- reacts with $NaHSO_3$ to give crystalline solids ?
a) Ethanol b) Acetic acid c) Acetone

xvii) ---------- is an example of aromatic aldehyde.
a) Glyoxal b) Succinaldehyde c) o-Anisaldehyde

xviii) Aldehyde reacts with a primary amine to give an ---------.
a) enamine b) Iminium salts c) Imine

B. State whether the following statements are true or false. (any three) 3

a) Nitration of phenol is an example of parallel reaction.
b) Triethylamine-water system has upper consolute temperature.
c) Diborane is a electron deficient molecule.
d) Melting and boiling points of elements of group 14 are increases in the group from C to Pb.
e) In the carbonyl group both 'C' and 'O' are sp hybridized.
f) Sodium borohydride is strong reducing agent.

c)	N_2O_4	iii)	$P_A = P^\circ_A \cdot X_A$
d)	B_2H_{6+4}	iv)	Separation of completely miscible liquid mixture
e)	$LiAlH_4$	v)	$P_A = P^\circ_A \cdot X_A$
f)	Acetophenone	vi)	Colourless
		vii)	Brown
		viii)	Reducing agent
		ix)	Nidoboranes

Q.2 Attempt any four of the following.

a) Define ideal solutions. What are the criteria for the solution to be an ideal? 5

b) The energy of activation of a gaseous reaction is 51 J/mol. Calculate the rate constant at 320 K, if it is 3.5×10^{-3} per second at 310 K. (R = 8.314 J/K/mol) 5

c) With suitable example explain: 5
i) Consecutive reactions.
ii) Partially miscible liquid pairs.

d) Explain the variation of mutual miscibility with temperature for phenol-water system. 5

e) State Raoult's law and explain the positive deviation shown by non-ideal solution from it. 5

f) State the important assumptions of collision theory of bimolecular reaction. 5

Q.3 Attempt any four of the following.

a) Discus the structure and bonding in diorane. 5

b) Explain inert pair effect in 13 group elements. 5

c) Explain synthesis of ammonia by Haber Bosch process. 5

d) Explain the structure of Silicon dioxide 5

e) Explain the preparation and properties of nitrogen dioxide 5

f) Explain the zone refining technique. 5

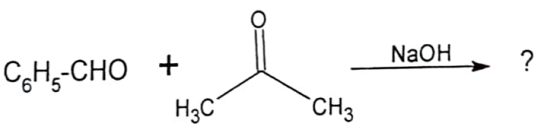
Q.4 Attempt any four of the following.

a) What is Benzoin condensation reaction? Explain its mechanism. 5

b) How will you convert ethyl aceto acetate into 5
i) 2-Butanone ii) 3-Methyl-2-butanone?

c) Explain the use of following reagents in preparation of aldehydes and ketones : 5
i) Pd on BaSO4, ii) Grignard reagent

d) Complete the following reaction and name the reaction involved. Give its mechanism. 5



e) i) What is the action of following reagents on Benzaldehyde? (Reactions expected) 5
a) Methyl magnesium bromide b) Sodium bisulphite
ii) How will you convert benzene into acetophenone?

f) i) How will you convert aceto acetic ester into succinic acid? 5
ii) What are active methylene compounds? Why are they considered as carbon acids?

Q.5 Attempt any four of the following.

a) Explain the activated complex theory of reaction rates. 5

b) Write a note on azeotropic liquid mixture showing minimum boiling point. 5

c) Explain the preparation of Borax. 5

d) Explain the trends in physical properties of elements of nitrogen family. 5

e) How is acetyl acetone converted into 2-Butanone and 2-Pentanone? 5

f) What is Cannizzaro's reaction? Explain its mechanism with suitable example. 5

AFRT Exam Sem-7

AFRT Exam Mech ...
Sem III
SYBSC
Sub Chemistry II

SYBSC Che
9/3/24

Duration: 2.5 hours

Total marks: 75

N. B.

1) All questions are compulsory.
2) Figures to the write indicate full marks.
3) Use of log table / non-programmable calculator is allowed.

Q.1 Select the correct option and complete the following sentences. (Attempt any nine) 09

A. a) ---------- polymer is having low density.
i) Linear ii) Branched iii) Cross linked

b) Decomposition of ethylene oxide is an example of ---------- reaction.
i) reversible ii) consecutive iii) parallel

c) In the thermal chain reactions, chain carriers are produced in ---------- step.
i) Inhibition ii) propagation iii) inhibition

d) The expression for Nernst distribution law, when solute associates in one of the two solvents are ----------.
i) $K = C_1/C_2$ ii) $K = C_1/n\sqrt{C_2}$ iii) $K = C1/C_2(1- x)$

e) A completely miscible solution can be separated by --------- process.
i) distillation ii) evaporation iii) filtration

f) Boron trihalides are .....in nature and their solutions in organic solvents are bad conductor of electricity.
i) covalent ii)ionic iii) dimeric

g) Floating zone technique is used for purification of.....
i) silicon ii) germanium iii) tin

h) In the hydrides of nitrogen family elements thermal stability .....
From NH_3 toSbH_3
i) increases ii) remain same iii) decreases

i) The type of hybridization boron undergoes in tetraborane is .....
i) sp^2 ii) sp^3 iii) sp

j) Aldehyde reacts with a primary amine to give an ---------.
i) enamine ii) Iminium salts iii) Imine

k) Which of the following compound can undergo Gattermann-Koch reaction easily?
i) Phenol ii) Nitrobenzene iii) Toluene

l) ---------- is an example of aromatic aldehyde.
i) Glyoxal ii) Succinaldehyde iii) o-Anisaldehyde

m) The products of Cannizzaro's reaction are ----------.
i) alcohol + salt of acid
ii) alkoxide ion + acid
iii) alkoxide ion + salt of acid

B. **State whether the following statements are true or false. (Attempt any three)** 03

a) For condensation polymerization monomers must have two or more than two functional groups.

b) Phenol water system has upper consolute temperature.

c) In case of gallium, solid is less dense than liquid.
d) Aromatic ketones can be prepared by FriedelCraft reaction.
e) Cyclopentanone is alicyclic ketone.

C. Match the following. (Attempt any three) 03

	Column A		Column B
a)	Viscosity average molecular weight	i)	Separation of completely miscible liquid mixture
b)	Fractional distillation	ii)	mild oxidizing agent
c)	B_nH_{n+4}	iii)	$\left[\frac{\Sigma N_i M_i^{1+\alpha}}{\Sigma N_i M_i}\right]^{1/\alpha}$
d)	B_nH_{n+6}	iv)	Separation of immiscible liquid mixture
e)	PCC	v)	Archnoboranes
		vi)	Nidoboranes
		vii)	$\left[\frac{\Sigma N_i M_i^{1-\alpha}}{\Sigma N_i M_i}\right]$
		viii)	Strong oxidizing agent

20

Q.2 Attempt any four of the following.

a) Define polymerization. Explain addition polymerization and condensation polymerization.
b) Define, lower consolute temperature and explain the variation of mutual miscibility with temperature for nicotine – water system
c) i) Explain parallel reaction with suitable example.
ii) Define monomer and polymer with suitable example.
d) State Raoult's law and explain the negative deviation shown by non-ideal solution from it.
e) A polymer sample contains 30% molecules of molecular weight 1000, 20% molecules of molecular weight 5000 and 50% molecules of molecular weight of 15000. Calculate number average and weight average molecular weights.
f) Define ideal solutions. What are the criteria for the solution to be an ideal? 20

Q.3 Attempt any four of the following.

a) Explain the structre of silica
b) Explain the structure and bonding in tetraborane.
c) Explain the preparation, properties, structure of nitric oxide.
d) Explain Crochralski pulling technique for silicon.
e) Explain inert pair effect in 13 group elements.
f) Explain the flow sheet for the synthesis of ammonia by Haber-Bosch process. 20

Q.4 Attempt any four of the following.

a) Explain the use of following reagents in preparation of aldehydes and ketones :
i) PCC ii) Grignard reagent
b) Complete the following reactions and name the reactions involved. Give

its mechanism.

$C_6H_5\text{-}CHO + CH_2(COOC_2H_5)_2 \xrightarrow{\text{Pyridine}} ?$

c) Complete the following reactions and name the products.

i) 2-Butanone $\xrightarrow[\text{ii) } H_2O,\ HCl]{\text{i) } LiAlH_4,\ \text{Dry ether}}$ A

ii) Acetophenone + Phenyl hydrazine $\longrightarrow$ A

d) i) How will you convert acetoacetic ester into succinic acid?

ii) What are active methylene compounds? Why are they considered as carbon acids?

e) How will you prepare cinnamaldehyde using Claisen Schmidt reaction? Give its mechanism.

f) i) What is the action of following reagents on Benzaldehyde? (Reactions expected)

a) Methyl magnesium bromide b) Sodium bisulphite

ii) How will you convert benzene into acetophenone?

Duration: 2 ½ hours Marks: 75

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. (08)

(Attempt any nine)

i Increment is definite portion withdrawn from _____

a) sampling unit b) universe c) sample

ii Incomplete drying of precipitate is _____ type of error.

a)instrumental b) methodic c) operational

iii Precipitation of ionic solid takes place if _____

a) solubility product > ionic product

b) solubility Product > ionic Product

c) solubility Product = ionic Product

iv Wavelength region of vacuum UV is _____

a) 1 to 180 nm b) 180 to 400 nm c) 400 to 780 nm

v Blowing of a pipette is _____ error.

a) operational b) instrumental c) methodic

vi DTA is a _____ method of analysis.

a) Titrimetric b) electro-analytical c) Thermal

vii _____ is an example of methodic error?

a) Improper response of the instrument

b) Weighing of hot crucible

c) Addition of excess amount of the titration

viii In titrimetry solution in conical flask is known as _____.

a) Titrant b) titrand c) reference

ix _____ is the unit of molar absorptivity.

a) $dm^3 eq^{-1} cm^{-1}$ b) $dm^3 mol^{-1} cm^{-1}$ c) $dm^3 mol^{-1} cm^{-3}$

x When ionic product is greater than solubility product it gives _____

a) Saturated solution b) unsaturated solution c) precipitate

xi In mass spectrometer method the property measured is _____

a) Change in mass of the sample

b) Weight of a sample soluble compound for measure

c) Measurement of mass to charge ratio

xii Complex metric titrations are titration between EDTA and _____.

a) Oxidizing agents b) metal ions c) anions

xiii Spectrophometric measurements belong to _____ method of analysis.

a) electro analytical b) titrimetric c) optical

B State whether the following sentences are **true** or **false.** (**Attempt any three**) 03

i All precipitates are required to be heated above 250 ^{0}C for drying

ii Cis and trans isomers can be distinguished using UV-visible spectroscopy

iii Different grating are used as a monochromator in photometers

iv Iodometry is one of the most important redox titration method

v Precision can be obtained only for a set of observations

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

Column A	Column B
1. Potassium Dichromate	a. Personal error
2. Decrease in solubility	b. Primary standard
3. Iodometry	c. Titration with direct iodine
4. Co-precipitation	d. Eosine
5. Precipitation titration	e. Methodic error
	f. Titration with liberated iodine
	g. Common ion effect
	h. Murexide

20

Attempt **any four** of the following

A Explain the term 1) universe 2) gross sampling 3) sample 4) sub sampling 5) analysis sample.

B What are personal errors? Give an account of operational errors?

C Explain classical methods of analysis with suitable example?

D Describe the methods of sampling of immiscible and flowing liquid

E Explain any two equipments used for sampling of solid?

F Three samples of alloy were analyzed for Ni content by gravimetric method, following results were obtained.
The actual Nickel content in each sample is 90% of the mass of respective sample, Calculate absolute error, relative error and relative error in pph, also comment on the result.

Sample No.	01	02	03
Mass of sample in mg	100	200	300
Amount of Ni in mg	88	176	264

20

Attempt **any four** of the following

A Explain conductometric titration of weak acid vs strong base

B Explain the theory of acid base indicators.

C Define standard solution? How are they prepared?

D Explain the set up of potentiometric titration

E Discuss various types of gravimetric analysis? Give one example each

F 10 cm^3 0.1M acetic acid is titrated against 0.1M NaOH solution at 298K. Calculate pH at equivalence point.
(Given Ka for acetic acid is 1.8×10^{-5}, Kw = 10^{-14})

20

Attempt **any four** of the following

A State Lambert's law. Derive mathematical expression for Lambert's law

B What is thermal method of analysis? Explain the classification of thermal methods.

C Define absorbance and transmittance. Difference between photometer and spectrophotometer

D Discuss the principle, instrumentation and working of single beam photoelectric colorimeter.

E Define the term analyte. Draw the block diagram of analytical instrument and explain the function of each component

F The absorbance of a 2×10^{-4}M solution when placed in a cell of length 1cm was found to be 0.234 at 535nm, calculate molar absorptivity. If the same solution is placed in cell of length 2cm calculate i) absorbance ii) transmittance and iii) % transmittance

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SYBSc
12/3/24

D.B.J college, chiplun
ATKT exam Mar 2024
Sem III
SYBSc.

Sub: Physics I

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.

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

i) Derive an expression for the Clausius- Clapeyron relation using Maxwells' second relation.

ii) Draw a neat diagram of a Carnot cycle. Name the process and derive the work done in each process.

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

i) Describe in brief the working of a steam engine. Derive an expression for its efficiency A Carnot engine working between 300 K and 700 K. Determine its efficiency. Determine the rise in Source temperature required to increase its efficiency by 40 %

ii) State and prove the Carnot's theorem. An inventor develops an engine working between 327°C and 27 °C and claims to have an efficiency of 52 %. Comment on this claim.

iii) Find the efficiency of the Carnot's engine working between the system point and the ice point. θ_1-100 °C and θ_2-0 °C.

iv) Calculate under what pressure water would boil at150 °C if the change in specific volume when 1 gram of water is converted into steam is 1676 CC. Given latent heat of vaporization of steam = 540 cal per gram; J = 4.2 x 10^7 erg/ cal and one atmospherepressure = 10^6 dynes / cm^3.

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

i) Derive an expression for the change of entropy of a perfect gas.

ii) Explain the principle of regenerative cooling.

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

i) Oxygen gas suffers Joule- Thompson expansion at initial temperature 270 ^{o}C and at a pressure difference of 150 atmosphere. Calculate its final temperature, if C_p = 7 Cal/ mole K, a = 1.32 litre^2. Atmosphere/ mole^2, b= 3.12x10^{-2}litre/mole and R = 2 cal/mole K

ii) What is refrigerator? Describe vapour compressor machine?

iii) How do you define zero on absolute scale of temperature?

iv) Mention whether the change in entropy of a mole of an ideal gas is positive, zero or negative, when thegas undergoes free expansion. (10)

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

i) Explain the IC type Sensor.

ii) How many types of pyrometer. Explain the optical Pyrometer. (10)

B] Attempt **any two** of the following.

i) Write down the advantages and limitations of thermometer.

ii) Write a short note on: Semiconductor Diode temperature sensor.

iii) Write the advantages of thermocouple?

iv) Write a short note on: ultrasonic temperature transducer. (15)

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

i) What is the difference between a thermocouple and a thermistor?

ii) Write a short note on: three lead wire RTD.

iii) Find the increase in the boiling point of water at 100 ^{o}C, when the pressure is increased by one atmosphere. Latent heat of vaporization of steam is 540 cal / g and 1 g of steam occupies a volume of 1677 cm^3.

iv) Write short notes on i) Fountain effect ii) Properties of liquid He- II

v) Give any five points to compare between a Petrol engine and Diesel engine

vi) State and explain the second law of thermodynamics

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S1825C
13/3/24

D. B. J. College, Chiplun
C.B.C.S. A.I.K.T. Examination March 2024
Class - S.Y.B.Sc. Semester - III
Time: 3 hours Paper - II
Max. Marks: 100

NB.: -
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of log-tables and non-programmable calculator is allowed.
4) Symbols have their usual meanings unless otherwise stated.

Q1. A) **Select the correct answer.** (12)

1. Which of the following theorems allows to transformation of a surface integral to a line integral?
   a) Green's theorem b) Gauss Theorem c) Stoke's theorem d) None of above
2. The coordinates $(4, 65^\circ, 40^\circ)$ belongs to ..... System.
   a) Cartesian b) cylindrical c) spherical polar d) curvilinear
3. Which of the following values is the potential barrier of the germanium transistor?
   a) 1V b) 0.7 V c) 1.2 V d) 0.5 V
4. In CE amplifier base current is----
   a) $i_B = I_B + i_b$ b) $i_b = I_B + i_b$ c) $i_B = I_b + i_B$ d) none of the above
5. To achieve undamped oscillations which of the following conditions must be meet?
   a) $\beta A_V = 0$ b) $\beta A_V = 1$ c) $\beta A_V = \infty$ d) None of above
6. In an ideal Op-amp, the input current is ----
   a) finite b) infinite c) low d) zero

B) **Answer in one sentence.** (03)

1. When the vector point function is said to be irrotational?
2. Write the formula for the Stability factor.
3. Gain of voltage follower is?

C) **Fill in the blanks.** (05)

1. ----theorem transforms the surface integral to line integrals.
2. If the voltage feedback is opposite in phase to the input feedback is called----
3. To achieve faithful amplification VBE should not fall below---- for silicon transistor.
4. The formula of power gain is ----
5. Common mode rejection ratio (CMRR) = ----

Q.2 A) Attempt any **one.** (08)

1. State and explain the fundamental theorem of gradients.
2. How we can convert the Cartesian coordinates into a spherical polar coordinates?

B) Attempt any **one.** (08)

1. State and explain the path integral of a vector function.
2. Find the volume of the sphere of radius R.

C) Attempt any **one**. (04)

1. State and explain the Curl theorem.
2. Evaluate by Stokes theorem $\oint (yzdx + zxdy + xydz)$ where C is the curve $x^2 + y^2 = 1, z = y^2$

Q3. **A)** Attempt any **one.** **(08)**

1. Explain in detail the need for stabilization.
2. Explain the concept of phase reversal in a CE amplifier circuit using graphical demonstration.

B) Attempt any **one.** **(08)**

1. With a neat diagram derive and express the circuit analysis of the collector feedback resistor.
2. Discuss the circuit element and their functions of the practical circuit of a CE transistor amplifier.

C) Attempt any **one.** **(04)**

1. In collector feedback biased silicon transistor circuit, R_C = 1 KΩ, R_B = 120 KΩ, and β = 100. Determine the operating point if V_{CC} = +12V.
2. Calculate the emitter current in the voltage divider bias circuit. Also, find the value of V_{CE} and collector potential V_C. Given: R_1 = 10 KΩ, , R_2 = 10KΩ, , V_{CC} = 20 V, R_C = 1 KΩ, R_E = 5 KΩ,

Q4. **A)** Attempt any **one.** **(08)**

1. Explain the circuit action of Colpitts oscillator.
2. Show that OP-amp as a summing amplifier.

B) Attempt any **one** **(08)**

1. With a neat diagram, explain the action of the Wien bridge oscillator.
2. Show that $V_O = -RC\frac{dv_i}{dt}$

C) Attempt any **one** **(04)**

1. A 1 *pf* capacitor is available. Choose the inductor values in a Hartley oscillator so that *f* = 1 MHz and β= 0.2.
2. With neat diagram shows that OP-amp as a square wave generator.

Q5. Attempt any **Four** of the following. **(20)**

i) Explain the space integral.

ii) Calculate $\int_C (x^2 dy - y dx)$ over the straight line $y = x$ from (0,0) to (1,1)

iii) Explain the input resistance (impedance) of an amplifier.

iv) Discuss the bandwidth of an amplifier.

v) Derive an expression of the gain of a non-inverting amplifier.

vi) Discuss the basic principle of R - C phase shift using a phaser diagram.

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D.B.J. College, Chiplun
ATKT Exam Mar. 2024
Sem III
SYBSC
Sub: Physics II

SYBSC
13/3/24

Time: $2\frac{1}{2}$ hours Max. Marks: 75

NB.:- 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of log tables and non-programmable calculator is allowed.
4) Symbols have their usual meanings unless otherwise stated.

Q1. A) Attempt any **one.** **(10)**

i) Discuss the emitter bias method for transistor biasing. State its advantages and disadvantages.

ii) Describe the advantages of negative feedback.

B) Attempt any **two.** **(10)**

i) What is transistor biasing and inherent variations of transistor parameters?

ii) Explain the term phase inversion in CE amplifier with a graphical demonstration.

iii) Discuss the term thermal runaway.

iv) In collector feedback biased silicon transistor circuit, $R_C = 2K\Omega$, $R_B = 100\ K\Omega$, and $\beta = 100$. Determine the operating point if $V_{CC} = +12$ V.

Q.2 A) Attempt any **one.** **(10)**

i) Explain the operation of the L- C tank circuit with neat diagrams.

ii) Discuss OP-amp input/output polarity relationship.

B) Attempt any **two.** **(10)**

i) Discuss requirements for oscillations.

ii) Explain the Barkhausen criterion in the case of the oscillator.

iii) Show how OP-amp acts as a subtractor.

iv) Calculate the output voltage of an OP-amp working as a differentiator; a ramp of 3 V height drives the circuit and has a width of 3 msec. If the R_fC time constant is 1 msec for $C = 0.1\ \mu f$.

Q.3 A) Attempt any **one.** **(10)**

i) Design an R-S flip-flop using NOR gates and draw the output waveform. Why S=1, R=1 condition is invalid in the R-S flip-flop?

ii) Construct a 4-bit serial in parallel out (SIPO) shift register using JK flipflop and explain its operation.

B) Attempt any **two.** **(10)**

i) Explain the Master-Slave JK flipflop system with a truth table.

ii) Explain the term shift register and types of shift register.

iii) Explain the working of the Asynchronous 3-bit binary ripple counter.

iv) Construct MOD-3 counter using J-K flip-flop.

Q4. Attempt any **three.** **(15)**

i) Derive an expression for stability factor.

ii) Explain the term bandwidth of an amplifier.

iii) In a Wien bridge oscillator circuit, $R_1 = R_2 = 220\ K\Omega$ and $C_1 = C_2 = 250\ \mu f$. determine the frequency of oscillations.

iv) Derive an expression for OP-amp as a non-inverting amplifier.

v) Explain the operation of the Mod 5 counter.

vi) Explain Mod-8 Synchronous counter.

AIKT ... SYBSC

D.B.J. College, Chiplun
AIKT Exam March 2024
Sem III
SYBSC.
Sub: Physics III

SYBSC
14/3/24

[Time: 2 ½ Hours] [Marks: 75]

N. B.: (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.
(3) Draw **neatlabelled**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) Describe the method to solve the second order homogeneous differential equation with constant coefficients. Hence solve $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = 0$.

(ii) Solve the following equation by successive integration method.

(a) $\frac{d^2y}{dx^2} - 3y + 2y = xe^x$ (b) $\frac{d^2y}{dx^2} + 2y + y = x$

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

(i) Find λ if the given equation is exact; $(xy^2 + \lambda x^2 y)dx + (x + y)x^2 dy = 0$.

(ii) Show that, $x^2 = 2y^2 \ln y$ is a solution of $\frac{dy}{dx} = \frac{xy}{x^2+y^2}$

(iii) Solve the equation for Growth of current in an LR Circuit $L\frac{di}{dt} + iR = E$.

(iv) Solve the equation for Newton's law of cooling $\left(\frac{d\theta}{dt}\right) = -k(\theta - \theta_0)$.

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

(i) Describe some commonly used partial differential equations.

(ii) Solve second order non-homogeneous linear ordinary differential equation with constant coefficients.

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

(i) The equation of motion of a body falling under gravity in a resistive medium is, $\frac{dv}{dt} + bv = g$, The body starts from rest, solve for velocity v.

(ii) A particle moves with SHM of period 12 seconds, travels 8 cm from the position of rest in 2 seconds. Find the amplitude, maximum velocity and the velocity at the end of 2 seconds.

(iii) A spring of constant K = 700 N/m hangs in a vertical position with upper end fixed. A mass of 7 kg is attached to the free end. The mass is pulled down by 0.05 m from rest and released. Neglecting air resistance, find period and frequency of motion of the mass.

(iv) Solve the differential equation: $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = x$.

10

Q. 3 (A) Attempt ANY ONE.

(i) What is meant by Reverberation and Reverberation time? Explain the causes to form reverberation in a hall. How it can be minimized.

(ii) Explain the concept of modulation. Obtain the mathematical expression for Amplitude modulation.

10

(B) Attempt ANY TWO.

(i) Describe the types of sound absorbers used in the halls.

(ii) Explain the concept of Amplitude Shift Keys.

(iii) Explain the concept of Phase Shift Keys.

(iv) Discuss the process of Super Heterodyne performed in receivers.

15

Q. 4 Attempt ANY THREE.

(i) Show that x^2-y^2 = x is a solution of $2 = xy\frac{dy}{dx} = x^2 - y^2$.

(ii) Solve the equation for Radioactive decay: $\frac{dN(t)}{dt} = -\lambda N(t)$.

(iii) Solve two dimensional Laplace's equation; $\frac{\partial^2 \emptyset}{\partial x^2} + \frac{\partial^2 \emptyset}{\partial y^2} = 0$.

(iv) Solve the equation; $(2x^2 + 3y^2 - 7)xdx - (3x^2 + 2y^2 - 8)ydy = 0$.

(v) A hall of 5500 m^3 of volume has the absorbing surface of 750 m^2 and average absorption co-efficient 0.504. Calculate reverberation time.

(vi) Explain the concept and types of communication systems.

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