F.Y.B.S.C

A.T.K.T. (B.T. IQ)

Exam.

OCT-2024-25.

SEM. II

DBJ College, Chiplun

F4B.com/BA/BSc Sem II ATKT Exam. Oct '2024

Sub: Foundation Course – I

Time : 2½ Hours Date - 03/10/2024 **[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) Any type of information on any topic is available within fraction of second with the help of -----
A) E-Mail B) Fax C) Internet D) GPS

2) In the Universal Declaration of Human Rights (UDHR) declaration consists of a preamble and ------ article.
A) 30 B) 38 C) 40 D) 48

3) Which of the following gas is depleting because of the increasing consumption of fossil fuels?
A) Ozone B) Carbon dioxide C) Nitrogen oxide D) Lead oxide

4) Conflicts emerge when there is a lack of understanding.
A) money B) opportunities C) understanding D) competition

5 Article ---- of the Indian Constitution recognises the right to life and personal liberty.
A) 19 B) 20 C) 21 D) 22

6 Mobile phones are also used for ------
A) Traditional B) Book C) Fax D) SMS

7 Remote sensing satellites are called ------ because they pass over both polar regions of the earth in N-S direction.
A) Equatorial orbit B) Polar orbit C) Environment D) None of the above

8 Maslow originally identified -----set of needs.
A) One B) Two C) Three D) Five

9 Values are central organizing principles or ideas that ---------- and ---------- human behavior.
A) govern and determine B) predict and determine
C) govern and predict D) analyse and predict

10 ---------- can be defined as the most basic means of settling our differences.
A) Giving representations B) Negotiation
C) Confrontation D) Mediation

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

1 Video conferencing does not save time in communication.
2 The International Labour Organisation (ILO) was established in 1919.
3 Abiotic means non living factors.
4 Conflicts are an increasing common source of stress.
5 Road transport accounts for major share of air pollution in the cities.
6 Globalisation has not increased the wages of labour.
7 Life of a person cannot be taken away by any one.
8 sun is the ultimate source of energy.
9 There are three major agents of Socialization.
10 Brain drain is a serious problem of migration.

Q. 2 State the impact of globalization on employment. 15

OR

Q. 2 Explain the concept of human rights. State its characteristics.

Q. 3 Describe the effects of environmental degradation on human life. 15

OR

Q. 3 Discuss the food chain.

Q.4 What is stress? State the types of stress. 15

OR

Q. 4 What is migration? Discuss the effect of migration.

Q. 5 Write a detailed note on Maslow's theory of self actualisation. 15

OR

Q. 5 Write short notes on (any three)

a) Liberalization
b) Farmer's Suicide
c) Conflict and its levels
d) Pyramid of Biomass
e) Causes of Aggression

(मराठी रूपांतर)

वेळ: २ ½ तास एकूण गुण : ७५

सूचना : १) सर्व प्रश्न अनिवार्य आहे २) उजवीकडील अंक पूर्ण गुण दर्शवितात.
३) आवश्यक वाटल्यास इंग्रजी प्रश्नपत्रिका पहावी.

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

१) ---- च्या सहाय्याने कोणत्याही विषयावरील कोणत्याही प्रकारची माहिती सेकंदाच्या अंशात उपलब्ध असते.
अ) ई-मेल ब) फॅक्स क) इंटरनेट ड) जीपीएस

२) मानवी हक्कांच्या सार्वत्रिक जाहीरनाम्यात (UDHR) घोषणापत्रात प्रस्तावना आणि ------ कलमे असतात.
अ) 30 ब) 38 क) 40 ड) 48

३) जीवाश्म इंधनांच्या वाढत्या वापरामुळे खालीलपैकी कोणता गॅस कमी होत आहे?
अ) ओझोन ब) कार्बन डाय ऑक्साईड
क) नायट्रोजन ऑक्साईड ड) लीड ऑक्साईड

४) जेव्हा -------चा अभाव असतो तेव्हा संघर्ष उद्भवतात.
अ) पैसा ब) संधी क) समजूतदारपणा ड) स्पर्धा

५) भारतीय राज्यघटनेच्या कलम ------ मध्ये जीवनाचा आणि वैयक्तिक स्वातंत्र्याचा अधिकार मान्य केला आहे.
अ) 19 ब) 20 क) 21 ड) 22

६) ----- साठी मोबाइल फोन देखील वापरले जातात.
अ) पारंपारिक ब) पुस्तक क) फॅक्स ड) एसएमएस

७) रिमोट सेन्सिंग उपग्रहांना ----- म्हणतात कारण ते पृथ्वीच्या दोन्ही ध्रुवीय प्रदेशांमधून एन-एस (N-S) दिशेने जातात.
अ) विषुववृत्त कक्ष ब) ध्रुवप्रवाह क) पर्यावरण ड) वरीलपैकी काहीही नाही

८) मास्लोने मूलत: गरजा ------ क्रमात ओळखल्या आहेत.
अ) एक ब) दोन क) तीन ड) पाच

९) मूल्ये मध्यवर्ती संघटनेची तत्त्वे किंवा कल्पना असतात जी मानवी वर्तन ---- -- आणि ------ करतात.
अ) नियंत्रित आणि निर्धारित ब) भविष्यवाणी आणि निर्धारित
क) नियंत्रित आणि भविष्यवाणी ड) विश्लेषण आणि भविष्यवाणी

१०) ------ म्हणजे आपले मतभेद मिटवण्याचे सर्वात मूलभूत साधन होय.
अ) निवेदने देणे ब) वाटाघाटी क) संघर्ष ड) मध्यस्थी

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

१) व्हिडिओ कॉन्फरन्सिंगमुळे संप्रेषणात वेळ वाचत नाही.
२) आंतरराष्ट्रीय कामगार संघटना (ILO) ची स्थापना १९१९ मध्ये झाली.
३) अजैविक म्हणजे निर्जीव घटक होय.
४) संघर्ष हा तणावाचा वाढता सामान्य स्रोत आहे.
५) शहरातील वायू प्रदूषणात रस्ते वाहतुकीचा मोठा वाटा आहे.
६) जागतिकीकरणामुळे मजुरांच्या वेतनात वाढ झालेली नाही.
७) एखाद्या व्यक्तीचे जीवन कोणीही हिरावून घेऊ शकत नाही.
८) सूर्य हा उर्जेचा अंतिम स्रोत आहे.
९) समाजीकरणाचे तीन मुख्य घटक आहेत.
१०) बुद्धिमंत्तांचे देशाटन ही स्थलांतराची गंभीर समस्या आहे.

प्रश्न २ १) जागतिकीकरणाचा रोजगारावर होणारा परिणाम सांगा. किंवा १५
२) मानवी हक्क संकल्पना स्पष्ट करून त्याची वैशिष्ट्ये स्पष्ट करा.

प्रश्न ३ १) पर्यावरण ऱ्हासाचे मानवी जीवनावर होणाऱ्या परिणामाचे वर्णन करा. किंवा १५
२) अन्नसाखळीची चर्चा करा.

प्रश्न ४ १) तणाव म्हणजे काय? तणावाचे प्रकार सांगा. किंवा १५
२) स्थलांतर म्हणजे काय? स्थलांतराच्या परिणामाची चर्चा करा.

प्रश्न ५ १) मास्लोच्या आत्म-वास्तविकतेच्या सिद्धांत तपशीलवार लिहा. किंवा १५
२) टीपा लिहा (कोणत्याही तीन)
अ) उदारीकरण
ब) शेतकऱ्यांचीआत्महत्या
क) संघर्ष आणि त्याच्या पातळ्या
ड) परिस्थितीक मनोरा
ई) आक्रमकतेची कारणे

F.Y. Biotechnology Sem - II MKT Examination Oct 2024
Subject :- Biochemistry
Date :- 07-10-2024

FYBT
7/10/24

Time – 2 1/2 hours Marks–75

Note: Attempt **all** questions.
All questions carry **equal** marks.
Under **Q.2, Q.3 and Q.4** attempt A and B **OR** C and D
Draw **neat labeled diagrams** wherever necessary.

Q.1 **A)** **Attempt any fifteen of the following.** (15)

1. Define Isoelectric pH.
2. Draw the structure of glutamic acid.
3. Give any two examples of basic amino acids.
4. Define glycogenic amino acid.
5. Write the example of nonapeptide synthesized by posterior pituitary gland.
6. All the amino acids except ---------- have optical isomers.
7. Hemoglobin is example of chromoprotein (state true/false).
8. Enlist the bonds present in the tertiary structure of protein.
9. Define cofactor.
10. The non-protein part of enzyme is known as ----------.
11. Give an example of irreversible inhibitor of enzyme.
12. Enzymes increase the activation energy of the reactants (state true/false).
13. Define :Solubility.
14. ----------enzyme is used in cheese production.
15. Define stationary phase.
16. Sephardex is used as a stationary phase in column chromatography (state true/false).
17. Give an application of chromatography.
18. What is the full form of PAGE?
19. Define absorption spectrum.
20. Give an example of reagent used in precipitation.

Q.2 **A)** Classify amino acids on the basis of their nutritional requirements. **(08)**

Q.2 **B)** Describe the simple proteins with suitable examples. **(07)**

OR

Q.2 **C)** Elaborate on β pleated sheet structure of protein. **(08)**

Q.2 **D)** Describe the properties of denatured proteins. **(07)**

Q.3 **A)** Explain the classes of enzyme with suitable examples. **(08)**

Q.3 **B)** Describe the non competitive inhibition of enzyme. **(07)**

OR

Q.3 **C)** Elaborate on theories of enzyme-substrate complex formation. **(08)**

Q.3 **D)** Describe the effect of temperature on enzyme activity. **(07)**

Q.4 A) Describe the principle and working of paper chromatography. (08)

Q.4 B) Define electrophoresis. Enumerate the factors affecting on electrophoresis. (07)

OR

Q.4 C) Describe the applications and limitations of Beer-Lambert's law. (08)

Q.4 D) Define filtration and enlist its applications. (07)

Q.5 **Write short notes on any three of the following.** (15)

a. Salting out.
b. Fibrous proteins.
c. Isoenzymes of creatine phoshokinsae.
d. Lineweaver Burk plot.
e. Distillation.

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FYBSc ATKT
4/10/24

P.B.T. college, Chiplun
F.Y. B.Sc. Sem - II ATKT Examination Oct 2024
Subject :- Physics - I
Date :- 04 - 10 - 2024

[Time: 2 ½ Hours] [Marks: 75]

N. B.: (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.
(3) Draw **neatlabeled**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) State the sign conventions used for the lens systems. Hence derive an expression for the focal length of a lens in terms of radii of curvature and refractive index.

(ii) Define convex lens and concave lens. Show that product of the distances of two conjugate foci equals the square of the focal length of the lens.

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

(i) Determine the dispersive power for crown and flint glass knowing the following refractive indices; (**Crown:**μ_{violet} = 1.5230, μ_{Yellow} = 1.5170, μ_{Red} = 1.5145); (**Flint:**μ_{violet} = 1.6637, μ_{Yellow} = 1.6520, μ_{Red} = 1.6444).

(ii) What is the change in the focal length of the lens, if a convex lens of focal length ***0.30 m*** and refractive index ***1.67*** is immersed in water of refractive index ***1.33***?

(iii) Derive an expression for longitudinal chromatic aberration (μ = ***finite***) for non–parallel rays.

(iv) Explain, how you will reduce spherical aberration by using the system of two thin Plano-convex lenses, producing equal deviation in the rays.

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

(i) Explain the interference effect produced by a parallel sided thin film in reflected light.

(ii) Give the construction and working of Ramsden's eye piece. Where you will locate the cross wire?

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

(i) In a wedge shaped film, the distance of nth bright band from the point of contact is given by; Show that, all the dark and bright bands are of the same width.

(ii) Write a short note on refracting astronomical telescope.

(iii) A parallel beam of light of wavelength ***5890 Å*** illuminates a thin film of refractive index ***1.5***; such that the angle of refraction in the film is 60^0. Find the minimum thickness of the film that will appear dark in reflected light.

(iv) In a wedge shaped film, the fringe width is 0.05×10^{-5} *m*, when monochromatic light of wavelength ***5000 Å*** incident normally on an air wedge, find the angle of wedge in radian.

Q. 3 (A) Attempt ANY ONE. 10

(i) Explain the construction and working of *He – Ne* laser.

(ii) What is total internal reflection? Obtain its condition. How it is used in optical fiber? Explain the light propagation through an optical fiber.

Q.3 (B) Attempt ANY TWO. 10

(i) The laser light of wavelength *7200 Å* and aperture *0.045 m* is targeted on the moon. If the moon is at a distance of about 4×10^5 *km* from the earth (neglect earth's atmospheric effect), find **(a)** angular spread of the beam and **(b)** axial spread when the laser reaches the moon surface.

(ii) Describe construction and working of a ***Ruby laser*** using a neat labelled diagram.

(iii) Describe the structure of step index optical fiber. Explain propagation of light through it.

(iv) The core and cladding of an optical fiber has refractive index of *1.5* and *1.47* respectively. Find acceptance angle in air and the critical angle for core–cladding interface.

Q. 4 Attempt ANY THREE. 15

(i) Derive the expression for longitudinal chromatic aberration (μ = ***finite***) for axial point object.

(ii) A soap film 0.5×10^{-4} *cm* thick is observed at an angle 25^0 to the normal. If the refractive index of a soap film is *4/3*, find the wavelengths of light in the visible spectrum that will not be present from the reflected light.

(iii) Newton's rings are formed with a light of wavelength *6700 Å*. Find the radius of 40th dark ring and the radius of curvature of the lens; if the radius of 10th dark ring is 1.1×10^{-2} *m*.

(iv) Calculate the focal length of the eyepiece and also the magnifying power of the telescope when the telescope is mounted to view objects at infinity. An object at a distance *250 cm* is focused by using a telescope of focal length *100 cm*. The magnifying power is *6* when it is adjusted to form the image at infinity.

(v) A laser beam can be focused on an area equal to the square of its wavelength. For He–Ne laser, the wavelength of emitted light is *6328 Å*. If the laser radiates energy at the rate of *1mW*, find the intensity of the focused beam.

(vi) A silica optical fiber has a core of refractive index *1.50* and a cladding of a refractive index *1.47*. Compute **(a)** critical angle at core–cladding interface, **(b)** the numerical aperture and **(c)** the acceptance angle in air.

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Date - 04/10/2024

FY BA, sem - II, Exam oct 2024

Sub - Communication Skills in English (CSE)

Time: 2.5 Hrs **Marks: 80**

FYBA 4/10/24 AIK

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

Q.1. Write short notes on **any four** of the following. **20**

a. Distinction between American and British English
b. Appropriacy in the Use of English
c. Non-verbal Communication
d. Use of ICT for communication
e. Types of Interview
f. Creative Writing

Q.2. Read the passage carefully and answer the questions given below. **20**

A sanctuary may be defined as a place where Man is passive and the rest of Nature active. Till quite recently Nature had her own sanctuaries, where man either did not go at all or only as a tool-using animal in comparatively small numbers. But now, in this machinery age, there is no place left where man cannot go with overwhelming forces at his command. He can strangle to death all the nobler wild life in the world to-day. To-morrow he certainly will have done so, unless he exercises due foresight and self-control in the meantime.

There is not the slightest doubt that birds and mammals are now being killed off much faster than they can breed. And it is always the largest and noblest forms of life that suffer most. The whales and elephants, lions and eagles, go. The rats and flies, and all mean parasites, remain. This is inevitable in certain cases. But it is wanton killing off that I am speaking of to-night. Civilized man begins by destroying the very forms of wild life he learns to appreciate most when he becomes still more civilized. The obvious remedy is to begin conservation at an earlier stage, when it is easier and better in every way, by enforcing laws for close seasons, game preserves, the selective protection of certain species, and sanctuaries.

I have just defined a sanctuary as a place where man is passive and the rest of Nature active. But this general definition is too absolute for any special case. The mere fact that man has to protect a sanctuary does away with his purely passive attitude. Then, he can be beneficially active by destroying pests and parasites, like bot flies or mosquitoes, and by finding antidotes for diseases like the epidemic, which periodically kills off the rabbits and thus starves many of the carnivore to death. But, except in cases where experiment has proved his intervention to be beneficial, the less he upsets the balance of Nature the better, even when he tries to be an earthly Providence.

1. What is a sanctuary? Why are they necessary in today's age? (2)
2. Which life forms suffer the most and which remains? (2)

3. What is the remedy to save animals?
4. Where can man be beneficially active? (2)
5. Suggest any two ways for animal conservation. (2)
6. Find words from the passage, which mean the following: (2)
   i) knowing or being familiar with someone or something (2)
   ii) deliberate
7. Give antonyms of the following words:
   i) inevitable ii) appreciate (2)
8. Identify the suffix and root of the following words:
   i) protection ii) experiment (2)
9. Change the class of following words by adding suitable suffixes:
   i) doubt ii) benefit (2)
10. Make your own sentences using the following words:
   i) overwhelming ii) conservation (2)

Q.3. Attempt **any two** of the following questions. 20

A. On the World Environment day, you have to give a presentation on the topic of "Nurture Nature". Prepare a draft of your presentation.

B. Imagine that you have got an opportunity to interview Sreedhara Somanath, the chairman of ISRO. Prepare a draft of the mock interview.

C. You have met a student of your college who does not use android phone. Prepare a draft of a group discussion among your friends and him about "Mobile Addiction among youngsters".

Q.4. A. Draft a report on **any one** of the following: 08

i. Draft a report on the exhibition organized by the department of Economics of your college.

ii. Prepare a news report on the Annual prize distribution of your college, which is to be given to a local newspaper.

B. Write an essay on the topic of "Importance of Yoga" 07

C. Write a short story in about 150-200 words by continuing the following story: "I jumped out of the bed at midnight....." 05

Duration: 2 hrs 30 min

Total Marks: 75

N.B: (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) Draw neat labelled 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** of the following. **(10)**

i) A sinusoidal voltage is applied across a series C-R combination. Obtain the expression for the current through the circuit.

ii) State and explain Norton's theorem. Illustrate it with suitable example.

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

i) Show how to measure the inductance of a coil using Maxwell's inductance bridge.

ii) An AC source specified as, $V = 220 \cos (1000\ t)$, is connected across a 500 Ω resistance. Calculate the root mean square emf and frequency of the source. Also calculate the root mean square current through the circuit.

iii) What is meant by resonance in a series LCR circuit? Why series LCR circuit is called an acceptor circuit?

iv) In a de Sauty's bridge, the balance condition is obtained when $R_4 = 1200\ \Omega$, $R_2 = 1720\ \Omega$ and $C_1 = 0.22\ \mu F$. Determine the capacitance of the other capacitor.

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

i) What are the types of filter circuits used? What is the need of filter circuit?

ii) Explain the input and output characteristics of common-base configuration. State the conclusions drawn from these characteristics.

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

i) Explain how a transistor can be used as a switching device.

ii) A 400 mW Zener diode with breakdown voltage 5 V has negligible resistance. Find the maximum current it can carry. What is the value of current limiting resistor for this Zener to carry maximum current, if the supply voltage is 15 V?

iii) Draw a circuit diagram of half wave rectifier. Explain its working with the help of waveform diagrams.

iv) Calculate the emitter current in a common-emitter transistor configuration for which $\beta = 100$ and $I_B = 25\ \mu A$. Hence calculate α.

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

i) Explain half adder and full adder with their logical circuits and truth table.

ii) What is sum of products (SOP) method? Which logic gates are preferred to implement it? Why?

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

i) Explain NAND gate with the help of their logical statement, logical symbol and truth table.

ii) Convert the following decimal numbers to their binary equivalents.
(a) 26.25 (b) 255

iii) Explain the applications of EXOR gates as
(a) Parity checker (b) Parity generator

iv) Complete the following. Show the conversions.
$(ABC.125)_{16} = (\quad)_2 = (\quad)_{10}$

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

i) What is an AC bridge? Obtain the conditions required to balance an AC bridge.

ii) A series circuit comprises of an inductance (200 μH), a capacitance (0.0005 μF) and a resistance (10 Ω). Find the resonant frequency and voltage magnification of the circuit when tuned to the resonance.

iii) What is load line? Explain how dc load line obtained on the output characteristics of common-emitter transistor?

iv) The maximum collector current that a transistor can carry is 500 mA and β is 300. What is the maximum allowable base current for the device?

v) State and prove De Morgan's second theorem.

vi) Prove the following Boolean equation: $A + \bar{A}.B + A.B = A + B$

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FY BSc
8/10/24

D. B. J. College, Chiplun
FY B.Sc Sem-II A.K.T. Examination Oct 2024
Subject :- Zoology (II)
Date :- 10-10-2024

Time: 3 hours. **Marks: 100**

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

Q. 1 A) Select correct answer and rewrite the following sentences. 05

i) ICMR has recommended an intake of ----------body weight for the first six months.
(80 cal/kg, 100 cal/kg, 120 cal/kg, 140 cal/kg)

ii) People with ---------- activity efficiently store fat.
(Low lipoprotein lipase, High lipoprotein lipase, Low sugar, High LDL)

iii) --------- anemia is caused due to diseased bone morrow.
(Vitamin deficiency, Aplastic, Hemolytic, Iron deficiency)

iv) ---------- is not concerned with the oral hygiene.
(Gingivitis, Periodontitis, Halitosis, Apenditis)

v) Electro Convulsive Therapy is practiced for ----------.
(Depression, Gonorrhea, Hepatitis, Insomnia)

Q. 1 B) Match the following columns. 05

Column – I	**Column - II**
i) Typhoid	a) ELISA
ii) AIDS	b) SAPEL
iii) Mobile	c) Oral Ty21a vaccine
iv) Heparin	d) SAR
v) Leprosy	e) Anticoagulant

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

i. Starvation is a severe deficiency in caloric energy intake.
ii. Attack phase in malarial eradication program lasts for three years.
iii. Obesity Class I has BMI rate between 35 and 39.9.
iv. Hyperthyroidism does not cause goiter.
v. Normal level of fasting plasma glucose is 80 to 100 mg/ml.

Q. 1 D) Answer in one sentence. 05

i. Define Obesity.
ii. What is the normal CD4 count in healthy human?
iii. Mention successive stages in smallpox.
iv. Write names of bacterium that causes Gonorrhea disease.
v. What should be the standard pH of potable water?

Q. 2 A) With reference to symptoms, causes and remedy describe Constipation. 10

OR

Q. 2 A) With reference to symptoms, causes and remedy describe Swine flu. 10

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

i) Comment on the importance of dietary fiber.
ii) Give importance of breast feeding to Baby.
iii) Give an account of Anemia.
iv) Describe causes and symptoms of flatulence.

(P.T.O.)

Q. 3 A) Briefly describe the Pulse Polio Immunization Program. 10

OR

Q. 3 A) Describe the factors essential to maintain social health. 10

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

a) Comment on the physical and social health issues.

b) With reference to radiation risk comment on mobile phones.

c) Enlist steps included in the small pox eradication program.

iv) Give an account on chemical disinfection of water.

Q. 4 A) With reference to causes, symptoms and preventive measures describe the Anxiety Disorder. 10

OR

Q. 4 A) Give an account on Asthma. 10

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

i) Comment on Hypertension.

ii) Enlist symptoms of Oral cancer? Add a note on diagnosis, remedy and its prevention.

iii) Describe various types of Hepatitis.

iv) Comment on causes, symptoms and control measures of Type 2 Diabetes.

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

a) Food and feeding during infancy.

b) PEM

c) Health education

d) Sex hygiene

e) Rabies

f) Insomnia

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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) Find the value of 'k' of the function $f(x) = \begin{cases} \frac{x^2-7x+12}{x-3} & for\ x \neq 3 \\ k & for\ x = 3 \end{cases}$ so that f is continuous at point $x = 3$

b) Find the left hand limit and right hand limit of the function at specified point $f(x) = \begin{cases} \frac{x^2-1}{x-1} & for\ x < 1 \\ 0 & at\ x = 1 \\ \frac{x^2-1}{x-1} & for\ x > 1 \end{cases}$ and check whether limit exists at point.

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

a) Find the left hand limit and right hand limit of the function at specified point $f(x) = |x^3|$ at $x = 0$.

b) Find the derivative of the function $f(x) = cos^{-1}(x)$ by inverse function theorem.

c) Let $f: \mathbb{R}^+ \to \mathbb{R}$ be given by $f(x) = \log(x)$ then prove that f is differentiable on $\mathbb{R}^+$ and $f'(x) = \frac{1}{x}$.

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

a) Find $\frac{dy}{dx}$ of $\cos(x^2 + 4x) + \log(x + y^2) = \sin(3xy^2)$ where y is the function of x.

b) Prove that every polynomial function is differentiable.

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

a) Let $f: \mathbb{R} \to \mathbb{R}$ be given by $f(x) = \tan(x)$ then prove that $f'(x) = sec^2(x)$.

b) Prove that $f: \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = \begin{cases} x + 1 & for\ x \leq 1 \\ 4x^2 - 1 & for\ x > 1 \end{cases}$ is continuous at $x = 1$ but is not differentiable at $x = 1$.

c) Prove that $f: \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = \begin{cases} \frac{1}{x}.\sin(x^2) & for\ x \neq 0 \\ 0 & for\ x = 0 \end{cases}$ is differentiable at $x = 0$.

Q.3 **A)** **Attempt <u>any one</u> questions of the following.** **(8)**

a) Let $f: \mathbb{R} \to \mathbb{R}$ be given by

i) $y = f(x) = e^{ax}$ *where* $a \in \mathbb{R}$ then prove that $y_n = a^n e^{ax}$

ii) $y = f(x) = a^{bx}$ *where* $a > 0$ *and* $b \in \mathbb{R}$ then prove that $y_n = b^n (log a)^n a^{bx}$

b) Let $f: \mathbb{R}^+ \to \mathbb{R}$ be given by $f(x) = \log(ax + b)$ then prove that $y_n = \frac{(-1)^n a^n (n-1)!}{(ax+b)^n}$.

B) **Attempt <u>any two</u> questions of the following.** **(12)**

a) Verify Cauchy's mean value theorem of the function $f(x) = x$ *and* $g(x) = x^3 + 4x^2 + 1$ in $[1, 2]$.

b) Verify Rolle's theorem of the function $f(x) = x^2 + 5x + 8$ in $[-5, 0]$.

c) Verify Lagrange's mean value theorem of the function $f(x) = x^2 + 5x + 6$ in $[0, 1]$.

Q.4 **Attempt <u>any three</u> questions of the following.** **(15)**

a) Find $\frac{dy}{dx}$ where y is a implicit of x if $3xy^3 + 7x^2y^2 = 10xy$.

b) Find 3rd derivative of $e^{ax} \sin(bx + c)$.

c) Evaluate the following limit $\lim_{x \to 0} \frac{\log(sin2x)}{\log(sinx)}$.

d) Find the derivative of $f(x) = \sin(5^{3x})$ if exist by using chain rule.

e) Prove that the function $f(x) = \sin(x)$ is continuous at $x = 0$.

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FY BSc
9/10/24

D. B. J. College Chiplun
FY BSc Sem-II ATKT Examination Oct 2024
Subject :- Discrete Mathematics (II)
Date :- 10-10-2024

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

Instruction: - 1. All questions are compulsory.
2. Use of calculator is not allowed.
3. Figures to the right indicate full marks.

Q1 A] Attempt any ONE. **(8 Marks)**

i) Show that the set $\mathbb{Z}$ (set of all integers) is countable.

ii) Verify explicit formula $S(n,k) = \frac{1}{k!}\sum_{j=0}^{k}(-1)^j\, kc_j\,(k-j)^n$ for n=7, k=4.

B) Attempt any TWO. **(12 Marks)**

i) How many different three letters initials can people have? Also find how many of them have no repetition in their initials? And how many of them begin with alphabet 'A'?

ii) Any five points are placed randomly in to a square of side 1 unit. Show that there are two points whose distance is at most $1/\sqrt{2}$.

iii) In a class of 32 boys and some girls. Each boy knows five of the girls and each girl knows four of the boys. How many girls are there in the class?

Q2 A] Attempt any ONE. **(8 Marks)**

i) State and prove Pascal's identity.

ii) Use Pascal's identity to prove that $\sum_{k=0}^{r}\binom{n+k}{k} = \binom{n+r+1}{r}$ whenever n and r are positive integers.

B) Attempt any TWO. **(12 Marks)**

i) Find how many positive integers from 1 to 160 which are not divisible by 2 or 3 or 5? Also find how many integers are divisible by 2 not by 3 or 5.

ii) Let n be a positive integer. Show that $\binom{2n}{n+1} + \binom{2n}{n} = \frac{1}{2}\binom{2n+1}{n+1}$

iii) Using prime factorization, evaluate (a) $\varphi(400)$ (b) $\varphi(396)$

Q3 A] Attempt any ONE. **(8 Marks)**

i) Solve the recurrence relation: $a_n = -3a_{n-1} - 3a_{n-2} - a_{n-3}$, $a_1 = a_2 = 3, a_3 = 7$.

ii) Let S_n be the set of permutations on $\mathbb{N}$. Then prove that $|S_n| = n!$

B) Attempt any TWO. **(12 Marks)**

i) Solve the recurrence relation: $a_n = -2a_{n-1} + 15a_{n-2}$, $a_0 = 0, a_1 = 1$.

ii) Let $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 2 & 7 & 5 & 3 & 6 & 1 & 4 \end{pmatrix}$ and $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 3 & 1 & 4 & 5 & 6 & 2 & 7 \end{pmatrix}$ be permutations in S_7. Then evaluate $(\alpha o\beta)^{-1}, (\beta o\alpha), \alpha^{-1} o\, \beta^{-1}$.

iii) List all permutations in S_4.

Q4 **Attempt any three of the following.** **(15 Marks)**

i) How many different arrangements can be made by using all letters of the word 'ASSASSINATION'?

ii) Six friends discover that they have a total of Rs. 2161 with them on a trip for some outings. Show that one or more of them must have at least Rs.361.

iii) Find number of terms, sum of all coefficients and coefficient of $y^3 z^2$ and $x^2 y^2 w$ in the expansion of $(w + x + y + z)^5$.

iv) Determine whether the permutation $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 3 & 1 & 2 & 8 & 7 & 4 & 6 & 5 \end{pmatrix}$ is even or odd.

v) Find first five terms of the recurrence relation $a_n = 0.5a_{n-1}, a_1 = 4$.

D.B.J College, Chiplun
FY B.Sc Sem-II ATKT Examination Oct 2024
Subject :- Zoology (I)
Date :- 09-10-2024

FYBSc
9/10/24

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) The triangular shaped age structure pyramid indicates.....population.

i) Stable ii) Declining iii) Expanding iv) Uniform

b) The .....also converts gaseous nitrogen into oxides.

i) Thunder ii) Lightning iii) Rain iv) Hails

c) .....is a type of animal interaction in which both the organisms are benefited.

i) Commensalism ii) Parasitism ii) Antibiosis iv) Mutualism

d) The Indian Wildlife Protection Act 1972 consists of .....Schedules.

i) 06 ii) 05 iii) 07 iv) 14

e) The Dugong is representative animal of .....National Park.

i) Tadoba ii) Keoladeo Ghana iii) Pirotan Island Marine iv) Jim Corbett

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

Column I	Column II
i) Concave shaped curve	a) Ladakh
ii) Urn shaped pyramid	b) Gir National Park
iii) Lotic habitat	c) Declining population
iv) Asiatic Lion	d) High mortality
v) Cold desert	e) River

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

a) Crude density is the density per unit of total space.
b) Lag phase of J-shaped growth curve shows slow growth of the population.
c) Commensalism is a positive type of animal interaction.
d) Extinct means likely to become endangered in the near future.
e) The Siberian Crane is the critically endangered crane species in the world.

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

a) Define [illegible]
b) Give two names of age structure pyramids.
c) Enlist the biotic components of ecosystem.
d) Give two names of representative animal species in the Tadoba National Park.
e) Define predation.

(P.T.O.)

Q. 2. A) Explain in detail the population growth patterns. **10**

OR

A) Explain fecundity and sex ratio. **10**

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

a) Survivorship curves.

b) Population interactions with suitable examples.

c) Types and uses of life tables.

d) Types of population densities.

Q. 3. A) Define animal interactions. Give an account on positive animal interactions. **10**

OR

A) Explain the impact of temperature on biota. **10**

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

a) Abiotic components of an ecosystem.

b) Ecological pyramids.

c) Nitrogen cycle.

d) Mutualism.

Q. 4) Answer any two of the following: **20**

a) Describe the ecotourism in India with importance on Ecotourism in Konkan.

b) Describe briefly the Kaziranga National Park with two representative animal species.

c) Explain in detail the Project Tiger.

d) Give an account on the flora, fauna and one representative animal species of Gir National Park.

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

a) Mortality.

b) Age structures.

c) Water cycle.

d) Mechanism of Human census.

e) Keoladeo Ghana National park.

f) Biopiracy in India.

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