FACULTY OF SCIENCE

B.Sc. II Year (New) (Practical) Examination 2009

Subject : Botany

Paper : II

QUESTION BANK

Time : 3 hours **Marks : 50**

Note : Answer all questions. Draw well labeled diagrams wherever necessary.

I. Prepare a double stained permanent mount of transverse section of given material "A". With a well labeled diagram give detail description and identify. Mention stains use. Leave the slide valuation by the examination. (8 marks)

(Preparation 2, Description 2, Diagram 2, Identification 1, Stains 1)

1. *Achyranthes* stem
2. *Boerhaaia* stem
3. *Bignonia* stem
4. *Dracena* stem
5. *Beta vulgaris* – Root

II. Prepare a temporary mount of epidermal peel of the given leaf material 'B' and identify the stomatal type. (6 marks)

(Preparation 2, Identification 2, Diagram 2)

6. Anomocytic (*Tridax, Tagetus, Cleome, Boerhaaia)* (any one)
7. Anisocytic (*Datura, Brassica, Crotolaria, Achyranthus*) (any one)
8. Paracytic (*Ixora, Hamelia, Arachis, Oldenlandia, Portulaca*) (any one)
9. Diacytic (*Ocimum, Crossandra, Barleria*) (any one)

III. Conduct the Pollen viability test 'C'
Evan Blue Method (6 marks)

(Preparation 2, Description 2, Identification 2)

OR

Isolate the embryo from the given material (6 marks)

(Preparation 2, Description 2, Identification 2)

10. *Senna* embryo
11. *Crotalaria* Embryo

IV. Assign the Specimens "D" and "E" to their respective families, giving reasons. Describe and classify. (2 x 8=16 marks)
(Description 4, Diagram 2, Floral formula and diagram 1, Classification 1)

12. Annonaceae
13. Cappardiaceae
14. Rutaceae
15. Fabaceae
16. Caesalpiniaceae

17. Mimosaceae
18. Cucurbitaceae
19. Apiceae
20. Asteraceae
21. Asclepiadaceae
22. Lamiaceae
23. Amaranthaceae
24. Euphorbiaceae
25. Orchidaceae
26. Poaceae

V. Identify and describe the Specimens / Slides with well labelled diagram. (4 x 2=8 marks)

Embryology 1, Palynology 1, Medicinal Botany – 2
(Description 1, Identification and diagram 1)

Slides (Embryology)
27. Anther W.M.
28. Microsporogenous tissue (Anther T.S)
29. Dicot Embryo T.S.
30. Monocot Embryo T.S.
31. Orthotropous Ovule
32. Anatropous Ovule
33. Campylotropous Ovule

Palynology
34. *Hibiscus* Pollen
35. *Acacia* Pollen
36. Grass Pollen
37. *Ocimum* Pollen

Specimens
38. Tippateega (*Tinospora cordifolia*)
39. Tulasi (*Ocimum sanctum*)
40. Pippallu (*Piper longum*)
41. Karaka (*Terminalia chebula*)
42. Kalabanda (*Aloe vera*)
43. Turmeric (*Curcuma longa*)
44. Aswagandha (*Withania somnifera*)
45. Sarpagandha (*Rauwolfia Serpentina*)
46. Nela usiri (*Phyllanthus amara*)
47. Amla (*Phyllanthus emblica*)
48. Brahmi (*Bacopa monnieri*)

VI. Herbarium and Record (6 marks)

FACULTY OF SCIENCE

B.Sc. II Year (Practical) Examination February 2010

Subject : Chemistry (New Syllabus)

Paper : II

QUESTION BANK

Time : 3 hours} **{Marks : 50**

I. Write a brief procedure for the following experiment and mention the principle involved in it. (5)

1. Estimate the amount of Barium as Barium sulphate gravimetrically in the given solution using dl H_2SO_4 or $(NH_4)_2 SO_4$.

2. Estimate the amount of sulphate as Barium sulphate gravimetrically in the given solution using Ba Cl_2 solution.

3. Estimate the amount of lead as lead chromate gravimetrically in the given solution using potassium chromate solution.

4. Estimate the amount of Nickel as Ni – DMG complex gravimetrically in the given solution using DMG solution.

5. Estimate the amount of magnesium as magnesium pyro-phosphate gravimetrically in the given solution using ammonium phosphate solution.

II. Carry out any one experiment allotted from the following : (35)

(1) Estimate the amount of Na_2CO_3 present in the given solution.
Your are provided with .
(a) a pure sample of $Na_2 CO_3$
(b) an approximate o.1 M solution of HCl

(2) Estimate the amount of $NaHCO_3$ present in the given solution.
You are provided with
(a) a pure sample of Na_2CO_3
(b) an approximate 0.1 M solution of HCl

(3) Estimate the amount of carbonate and bicarbonate in the given mixture.
You are provided with
(a) a pure sample of Na_2CO_3
(b) an approximate 0.1 M solution of HCl

(4) Estimate the amount of Ferrous ion present in the given solution (dichrometrically).
You are provided with a pure sample of $K_2Cr_2O_7$ solid.

(5) Estimate the amount of Ferrous ion present in the given solution.
You are provided with
(a) a pure sample of oxalic acid
(b) an approximate 0.02 M solution $KMnO_4$

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(6) Estimate the amount of Cu^{2+} ion present in the given solution iodometricaly.
You are provided with .
(a) a pure sample of solid $K_2Cr_2O_7$
(b) an approximate 0.1 M solution of hypo (sod thio sulphate)

(7) Estimate the amount $K_2Cr_2O_7$ present in the given solution.
You are provided with
(a) a pure sample of solid $K_2Cr_2O_7$
(b) an approximate 0.1 M hypo solution

(8) Estimate the amount Zn^{2+} present in the given solution complexometrically.
You are provided.
(a) a pure sample of $ZnSO_4$ / Mg SO_4. $7H_2O$
(b) an approximate 0. 01 M solution EDTA

(9) Estimate the hardness of the given water sample complexometrically.
You are provided with
(a) a pure sample of $ZnSO_4$ / Mg SO_4. $7H_2O$
(b) an approximate 0. 01 M solution of EDTA

(10) Estimate the amount of Zn^{2+} ion present in the given solution.
You are provided with
(a) a pure sample of $ZnSO_4$
(b) an approximate 0.05 M solution of potassium ferro cyanide

III. Record and Class work **(5)**

IV. Viva – Voce **(5)**

Scheme of Valuation for Carbonate – Bicarbonate Mixture

I. **Writing the principle and brief procedure** **(05)**

II. (1) **Preparation of standard solution.** **(04)**

(a) Weighing and wring weights W, W_2 upto 4th decimal place. (02)
(b) Calculation of molarity. (02)

(2) **Standardisation of HCl.** **(10)**
(a) Tabulation of readings (02)
(b) Titration (~~08~~) (06)
error upto 3% - 06
error upto 4% - 05
error upto 5% - 04
error above 5% - 02
(c) Calculate of molarity -02

(3) **Estimation** **(10+10)**
(a) Tabulation of readings -02 + 02
(b) Titration (stage I and stage II)
error upto 3% - 06 + 06 (06+06)
error upto 4% - 05 + 06
error upto 5% - 04 + 04
error upto 5% - 03 + 03
(c) Calculation of molarity - 02 + 02

(4) **Result** **(01)**

Record and class work **(05)**

Viva-Voce **(05)**

FACULTY OF SCIENCE

B.Sc. II Year (Practical) Examination 2010

Subject : Computer Science (New Syllabus)

Paper : II

Object Oriented Programming with Java and Data Structures

QUESTION BANK

Time : 3 hours} **{Marks : 50**

Note : Two programs are to asked in the Examination one in Part-A and the other in Part-B.

PART- A (JAVA)

1. Write a java program to determine the sum of the following harmonic series for a given value of 'n'.
   1+ ½ + ⅓ + ...+ 1/n.

2. Write a program to perform the following operations on string through interactive input.
   (a) Sort given Strings in alphabetical order.
   (b) Check whether one String is Sub String of another String or not.
   (c) Convert the Strings to uppercase.

3. Write a program to simulate on-line shopping.

4. Write a program to identify a duplicate value in vector.

5. Create two threads such that one of the thread print even no's and other prints odd no's up to a given range.

6. Define an exception called "Marks Out of Bound" Exception, that is thrown if the entered marks are greater than 100.

7. Write a Java program to shuffle the list elements using all the possible permutations.

8. Create a package called "Arithmetic" that contains methods to deal all arithmetic operations. Also, write a program to use the package.

9. Write an Applet program to design a simple calculator.

10. Write a program to read a text and count all the occurrences of a given word. Also, display their positions.

11. Write an applet illustrating sequence of events in an applet.

12. Illustrate the method of overriding in Java.

13. Write a program to fill elements into a list. Also, copy them in reverse order into other list.

14. Write an interactive program to accept name of person and validate it. If the name contains any numeric value throw an exception "Invalid Name".

15. Write an applet program to insert the text at the specified position.

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16. Prompt for the cost price and selling price of an article and display the profit (or) loss percentage.

17. Create an anonymous array in Java.

18. Create a font animation application that change the colors of text as and when prompted.

19. Write an interactive program to wish the user at different hours of the day.

20. Simulate the library information system i.e. maintain the list of books and borrower's details.

PART- B (DATA STRUCTURES)

21. Program to create, insert, delete and display operations on single linked list.

22. Program to create, insert, delete and display operations on double linked list.

23. Program to create, insert, delete and display operations on circular single linked list.

24. Program to split a single link list.

25. Program to reverse a single linked list.

26. Program to implement insertion sort.

27. Program to implement PUSH and POP operations on Stack using array method.

28. Program to implement PUSH and POP operations on Stack using Linked List method.

29. Program to implement insert and delete operations on Queue using array method.

30. Program to implement insert and delete operations on Queue using Linked List method.

31. Program to implement insert and delete operations on Priority Queue .

32. Program to implement insert and delete operations on Double Ended Queue.

33. Program to evaluate postfix expression by using Stack.

34. Program to construct Binary Search Tree and implement tree traversing techniques.

35. Program to delete a leaf node from binary search tree.

36. Program to implement Selection Sort.

37. Program to implement Bubble Sort.

38. Program to implement Operations on Circular Queue.

39. Program to implement Quick Sort.

40. Program to Find number of Leaf nodes and Non-Leaf nodes in Binary Search Tree.

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FACULTY OF SCIENCE

B.Sc. II Year (PRACTICAL) Examination

Subject: **Electronics** (New Syllabus) **Paper-II**

QUESTION BANK

Time: **3 Hours** Max. Marks: **50**

N.B.: Candidate may be asked to strike off any one question (among the allotted 8 (eight) experiments for the batch) which he doesn't wish to attempt. **ANY ONE MAY BE ALLOTTED TO THE CANDIDATE FROM THE REST.**

1. Study Amplitude Modulation wave patterns at various audio frequency (ies) and also at various amplitudes of audio frequency signals.
2. Using Amplitude Modulation find percent modulation at various amplitudes of audio frequency signal keeping carrier signal amplitude and frequency constant.
3. Study the Diode demodulator for Amplitude Modulation
4. Construct a Wien Bridge Oscillator using Op-Amp IC-741 and find out the frequency of oscillation.
5. Construct an Astable Multivibrator using IC-555 and measure the frequency and duty cycle for different values of R_A and R_B.
6. Construct an Astable Multivibrator using Op-Amp IC-741 at least for three different frequencies.
7. Construct single stage RC-coupled amplifier and study its frequency response curve and determine its bandwidth.
8. Construct a Voltage Comparator using IC-741 and plot a curve for input and output voltages.
9. Determine input off-set voltage, input offset current and input bias current of an Op-Amp., using IC-741.
10. Construct a Differentiator circuit using Op-Amp IC-741 and trace the output waveforms using CRO for a square wave input at different frequencies.
11. Construct an Integrator circuit using Op-Amp IC 741 and trace the output waveforms using square wave input at different frequencies.

...contd....(2)

12. Construct a RC-coupled amplifier using simulation method and study its frequency response and determine its bandwidth.

13. Using simulation method construct a RC-coupled amplifier for a band-width of 10KHz.

14. Construct a Wien-bridge Oscillator using simulation technique for a frequency of 10KHz.

15. Using simulation method construct an Astable Multivibrator for a 60% duty cycle.

16. Using simulation technique study Amplitude Modulation for a modulation index of 0.8.

17. Using simulation technique study Frequency Modulation for a modulation index of 5.

18. Using simulation method, study the effect of amplitude of modulating signal on the Amplitude Modulated wave keeping carrier frequency and amplitude constant.

19. Construct Half Wave Rectifier with and without (L and π section) filters. Estimate the ripple factor in each case.

20. Study the effect of capacitive and inductive filters on the rectified output.

21. Construct Full Wave Rectifier with and without (L and π section) filters. Estimate the ripple factor in each case.

22. Construct an Inverting amplifier using IC-741 for a gain of 10.

23. Construct a Non-Inverting amplifier using IC-741 for a gain of 2.

24. Construct a Voltage regulator using IC-7805 and study it line regulation.

25. Construct a Voltage regulator using IC-7805 and study it load regulation.

26. Construct a Voltage regulator using IC-7905 and study it line regulation.

27. Construct a Voltage regulator using IC-7905 and study it load regulation.

28. Construct Monostable Multivibrator using IC 741 and determine the pulse width.

29. Construct Monostable Multivibrator using IC-555 and determine the pulse width.

30. Construct Frequency Modulator and study the waveforms.

FACULTY OF SCIENCE

B.Sc. II Year (Practical) Examination February 2010

Subject : Physics (New Syllabus)

Paper : II

QUESTION BANK

Time : 3 hours} **{Marks : 50**

Note : Candidate may be asked to strike off any one question (Among the allotted 8 experiments for the batch which he / she does not want to attempt). Any one from the remaining may be allotted the candidate.

1. Find the coefficient of thermal conductivity of given bad conductor by Lee's method.
2. Determine Stefan's constant.
3. Determine the specific heat of given liquid by using Newton's law of cooling method.
4. Find the heating efficiency of an electrical kettle with varying voltages.
5. Determine the thickness of given wire by wedge method.
6. Using biprism, determine the wavelength of the given monochromatic light.
7. Find the distance between the two virtual sources using biprism experiment by assuming the wavelength of sodium light as 5893 Å.
8. Determine the radius of curvature of a given plano-convex using Newton's rings (wavelength of sodium light is 5893 Å).
9. Using Newton's rings apparatus find the wavelength of sodium light.
10. Find the resolving power of grating using spectrometer.
11. Determine the specific rotation of an optically active substance using polarimeter.
12. Using polarimeter estimate the concentration of the given sugar solution from the graph between angle of rotation and concentration.
13. Estimate the dispersive power of the material of the prism using spectrometer.
14. Determine the wavelength of light using diffraction grating by normal incidence method.
15. Find the grating element of the given grating by measuring the diffraction angle by normal incidence method. (Wavelength of sodium light is 5893 Å).

16. Estimate the number of lines per inch (LPI) drawn on the grating by measuring the diffraction angle by normal incidence method. (Wavelength of sodium light is 5893 Å).

17. By using minimum deviation method determine the wavelength of Sodium light using diffraction grating.

18. Determine the grating element of the given grating by measuring the angle of minimum deviation. (Wavelength of sodium light is 5893 Å).

19. Estimate the number of lines per inch (LPI) drawn on the grating by measuring the angle of minimum deviation. (Wavelength of sodium light is 5893 Å).

20. Determine the resolving power of given telescope.

21. Determine the refracting index of water and the glass by Boys' method.

22. Find the radii of curvature and refractive index of the given convex lens by Boys'. method.

23. Find the refractive index of water using Pulfrich refractometer.

24. Determine the refractive index of the given glass slab using Pulfrich refractometer by taking a liquid of known refractive index.

25. Determine the wavelength of laser light using diffracting.

26. Fid the grating element of the given grating using laser light of known wavelength.

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Subject : MATHEMATICS (New Syllabus)

Paper : II

QUESTION BANK

Time : 3 hours **Marks : 50**

UNIT – I GROUPS

1. Let S be the set of all real numbers except –1. Define * on S by
a * b = a + b + ab.
Show that (S, *) is an abelian group and find the solution of the equation
2*x*3 = 7 is S.

2. Let R* be the set of all real numbers except 0. Define * on R by a*b = |a|b.
Is (R, *) a group ? Justify your answer.

3. Prove that a non empty set G together with an associative binary operation * on G such that the equations a*x = b and y* a = b have a solution in G for all a, b $\in$ G is a group.

4. Determine which of the following subsets of the complex numbers are sub groups under addition of group C of complex numbers under addition.

   a. R
   b. Q +
   c. i R set of pure imaginary numbers including 0.

5. Let G be a group and a be a fixed element of G. Show that $H_a = \{ x \in B : xa=ax\}$ is a subgroup of G.

6. Let H be a subgroup of a group G. For a, b $\in$ G. Let a ~ b if and only if $ab^{-1} = \in H$. Show that ~ is an equivalence relation on G.

7. Which of the following functions from R into R are permutations of R

   a. f(x) = x + 1
   b. $f(x) = e^x$

8. If $\sigma, \mu \in S_6$ and $\sigma = \begin{bmatrix} 123456 \\ 314562 \end{bmatrix}$ $\mu = \begin{bmatrix} 123456 \\ 524316 \end{bmatrix}$

   a. $\sigma^2 \mu$
   b. μ^{2009}
   c. σ^{2009}

9. If $S = \{ \rho, \rho^2, \rho^3, \rho^4, \rho^5, \rho^6\}$ with $\rho = \begin{bmatrix} 12345 \\ 24513 \end{bmatrix}$ then by using multiplication table, prove that S forms an Abelian group.

10. Compute the indicated product of cycles that are permutations of {1,2,3,4,5,6,7,8}

    a. (1, 4, 5) (7, 8) (2, 5, 7)
    b. (1, 3, 2, 7) (4, 8, 6)

11.(a) Find the subgroup generated by 30 and also order of cyclic additive group of Z_{42}.
(b) In Z_{30} find the order of the subgroup generated by 18 and 24.

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12. Prove that n^{th} roots of unity form a cyclic group of order n.

13. Find all the generators of the cyclic group Z_{28}.

14.(a) Find all the cyclic subgroups of Z_{2009}.
(b) Find the number of subgroups of Z_{2009}.

15. Determine which of the following maps are homomorphisms. If the map is homomorphism describe its kernel.

a. $\varphi : Z \rightarrow R$ under addition given by $(n) = n$.

b. $\varphi : Z \rightarrow R$ under addition given by = the greatest integer $\leq x$.

c. $\varphi : Z_6 \rightarrow Z_2$ given $\varphi(x)$ = the remainder of x when divided by 2.

16. Define a mapping between groups G = p{1, -1, I, -I} and $\hat{G}$ = {1, -1} such that it is a homomorphism and find its kernel.

17. Let R under addition and R* under multiplication are groups. $\varphi : R \rightarrow R^*$ defined by $\varphi(x) = e^x$. Show that φ is Isomorphism.

18. Let (S,*) be the group of all real numbers except –1 under the operation * defined by a * b = a + b + ab. Show that (S, *) is isomorphic to the group R* of non zero real numbers under multiplication.

19. If N = {ρ,μ} then prove that N is not a normal subgroup of S_3 in which $\rho = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{bmatrix}$, $\mu = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{bmatrix}$.

20. Prove that 3Z is normal subgroup of Z. Find factor group Z/3Z and its order. Show that it is cyclic.

UNIT – II GROUPS

21. Let T = {a, b, c, d} Addition and Multiplication are defined by

+	a	b	c	d
a	a	b	c	d
b	b	a	d	c
c	c	d	a	b
d	d	c	b	a

x	a	b	c	d
a	a	a	a	a
b	a	b	a	b
c	a	c	a	c
d	a	d	a	d

Show that (T, +, x) is non commutative ring without unity.

22. (R, +, .) is a ring. Define $\oplus$,O on R by $\forall$ (a, r), (b, s) $\in$ R x Z

(a, r) $\oplus$ (b, s) = (a + b, r +s)

(a, r) O (b, s) = (a.b +rb+sa,rs)

Show that (R, $\oplus$, O) is a ring.

23. Find all the units of

a. Z_{14}
b. Z x Z

24.(a) Describe all the ring homomorphisms of Z x Z into Z.

(b) Describe all the ring homomorphisms of Z into Z.

25.(a) Solve the equation $x^2 - 5x + 6 = 0$ in Z_{12}

(b) Solve the equation $x^3 - 2x^2 - 3x = 0$ in Z_{12}

26.(a) $Z_4 \times 4Z$
(b) $Z_6 \times Z_{15}$
(c) $Z_3 \times 3Z$
(d) $Z_3 \times Z_3$

27. Define the quaternions of Hamilton and explain how it is a skew filed.

28. Show that the set of all nilpotent elements in a commutative ring R forms an ideal of R and R / N has no nonzero nilpotent elements.

29. R = {0, 2, 4, 6} $(R, +_8, X_8)$ is a ring. Let M = {0, 4} show that M is a maximal ideal of R but not prime ideal.

30. Define a Boolean ring. Show that Z_2 and $Z_2 \times Z_2$ are Boolean rings.

31.(a) Prove the left distributive law in $M_2(F)$.

(b) Show that $\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$ is not only a left divisor of '0' but also a right divisor of '0' in $M_2(F)$.

32. Let R be a commutative ring with unity of characteristic 4. Compute.

(a) $(a+b)^4$ (b) $(a+b)^3$

33. If N is an ideal of Z_{12}, calculate $\frac{Z_{12}}{N}$ and find all ideals of Z_{12}.

34. Find all prime ideals and maximal ideals of Z_6.

35. $\varnothing : Z \to Z \times Z$ be defined by $n\varnothing = (n, n)$, then show that
(a) 2Z is an ideal of Z,
(b) 2Z is not an ideal of Z x Z

36. Define $\varnothing_2 : Q[x] \to R$ as $(a_0 + a_1x + \ldots\ldots + a_nx^n)\varnothing_2 = a_0 + a_1 2 + \ldots\ldots + a_n 2^n$
Show that

(a) $x^2 + x - 6$ is the kernel N of $\varnothing_2$

(b) Show that $\frac{Q[x]}{N}$ is isomorphic to Q.

37. Let $\varnothing_2 : Z_7[x] \to Z_7$, Calculate
(a) $(x^2 + 3)\varnothing_2$
(b) $[(x^4+2x)(x^3 - 3x^2 + 3)\varnothing_3$

38. Find four elements in the kernel of each of the following homomorphisms
(a) $\varnothing_5 : Q[x] \to R$
(b) $\varnothing_4 : Q[x] \to R$

39. Find the sum and product of the given polynomials in the given polynomial ring
(a) $f(x) = 4x - 5 \quad g(x) = 2x^2 - 4x + 2$ in $z_8[x]$

(b) $f(x) = 2x^2 + 3x + 4 \quad g(x) = 3x^2 + 2x + 3$ in $z_6[x]$.

40.(a) Find how many polynomials are there of degree ≤ 3 in $Z^2[x]$ including zeroes.
(b) Find all zeroes of $x^2 + 1$ in Z_2.

UNIT - III REAL NUMBERS

41. Use the definition of limit to show that

(a) $\lim\left(\frac{3n+1}{2n+5}\right) = \frac{3}{2}$

(b) $\lim\frac{(-1)^n}{n+2} = 0$

42. Use limit theorems to establish the convergence of

(a) $\left(\frac{2n}{n^2+1}\right)$

(b) $\left(\frac{n^2-1}{2n^2+3}\right)$

(c) $\left(\frac{\sqrt{n}-1}{\sqrt{n}+1}\right)$

43. Use squeeze theorem to find limit of

(a) $(n!)^{\frac{1}{n^2}}$

(b) $\left(\frac{\sin n}{n}\right)$

44. Let (x_n) be a sequence of positive real numbers such that $L = \lim\left(\frac{x_{n+1}}{x_n}\right)$ exists. If $L < 1$, then (x_n) converge and $\lim(x_n) = 0$, apply this theorem to show that the sequence.

(a) $\left(\frac{n}{2^n}\right)$

(b) $\left(\frac{2^{3n}}{3^{2n}}\right)$ converge to zero

45.(a) Apply monotone convergence theorem to show that

$\lim_{n\to\infty}(y_n) = \frac{3}{2}$ where (y_n) is defined by $y = 1$, $y_{n+1} = \frac{1}{4}(2y_n + 3)$ for $n \geq 1$.

(b) Let $x1 = 8$, $xn+1 = \frac{x_n}{2} + 2$ for $n \in N$, show that (x_n) is bounded and monotone. Find its limit.

46. Let $(x_n) = = \frac{1}{1^2} + \frac{1}{2^2} + ... + \frac{1}{n^2}$ for each $n \in N$. Prove that (x_n) is increasing and bounded.

47. Show that the sequence

(a) $\left(1-(-1)^n + \frac{1}{n}\right)$

(b) $\left(\sin\frac{n\pi}{4}\right)$

are divergent by applying divergence criteria (i.e., (x_n) is divergent if it has two convergent subsequences whose limit are not equal.

48. Show directly from definition that

(a) $\left(\frac{n+1}{n}\right)$ is a Cauchy sequence

(b) $(-1)^n$ is not a Cauchy sequence.

49. Show that the sequence (x_n) defined by $x_1 = 1$, $x_2 = 2$, $x_n = \frac{1}{2}(x_{n-2} + x_{n-1})$ for $n > 2$ is a Cauchy sequence.

50. Define a contractive sequence. If $x_1 = 2$ and $x_{n+1} = 2 + \frac{1}{x_n}$ for $n > 1$, prove that (x_n) is a contractive sequence.

51. Using comparison test show that the series

(a) $\sum_{n=1}^{\infty} \frac{1}{n^3+n}$

(b) $\sum_{n=1}^{\infty} \frac{\cos n}{n^2}$ are convergent

52. Test for convergence or divergence the following series by applying limit comparison test

(a) $\sum_{n=1}^{\infty} \frac{1}{n(n+1)(n+2)}$

(b) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n+1}}$

53. Apply Leibnitz test to establish convergence or divergence of $\sum_{n=1}^{\infty} \frac{-1}{\sqrt{n}}$.

54. The equation $x^3 - 7x + 2 = 0$ has a root between 0 and 1. Use an appropriate contractive sequence (x_n) to approximate the root. Taking $x_1 = \frac{1}{2}$, calculate the root upto 4 iterations.

55.(a) Let f be defined for all $x \in IR$, $x \neq 2$, by $f(x) = \frac{x^2 + x - 6}{x - 2}$. Can f be defined at x = 2 in such a way that f is continuous at this point.

$$f(x) = \begin{cases} 0 & \text{for } x = 0 \\ \frac{1}{2} - x & \text{for } 0 < x < \frac{1}{2} \\ \frac{1}{2} & \text{for } x = \frac{1}{2} \\ \frac{3}{2} - x & \text{for } \frac{1}{2} < x < 1 \\ 1 & \text{for } x = 1 \end{cases}$$

56. Prove that the Dirichlets function defined by

f(x) = 1 if x is rational

f(x) = 0 if x is irrational

is not continuous at any point of IR.

57. Discuss the continuity of $f(x) = \frac{e^{\frac{1}{x}} - 1}{e^{\frac{1}{x}} + 1}$, $x \neq 0$, f(0) = 0, at x = 0.

58.(a) Show that the polynomial $P(x) = x^4 + 7^3 - 9$ has at least two real roots.

(b) Let f be continuous on the interval [0, 1] such that $f(x) = f\left(c + \frac{1}{2}\right)$.

59. If f is a continuous function of x satisfying the functional equation

f(x + y) = f(x) + f(y), show that f(x) = ax, where a is a contant.

60. Give an example of a function which is continuous in an open interval but fails to be uniformly continuous on that interval . Justify your answer.

UNIT –IV Differentiation and Integration

61. Verify Rolle's theorem for $f(x) = 2 + (x - 1)^{2/3}$ in [0, 2].

62. Discuss the applicability of Rolle's theorem to the function f(x) = |x| in [-1, 1}.

63. Verify Lagrange's Mean Valve theorem for f(x) = log x in [1, e].

Evaluate the following limits

64. $\lim_{x \to 0} \left(\frac{\tan x}{x} \right)^{\frac{1}{x^2}} ; (0, \infty)$.

65. $\lim_{x \to 0} \left(\frac{x^3}{e^x} \right) ; (0, \infty)$

66. $\lim_{x\to 0}\left(\frac{\log(x+1)}{\sin x}\right);(0,\frac{\pi}{2})$

67. $\lim_{x\to 0}\left(1+\frac{3}{x}\right);(0,\infty)$

68. $\lim_{x\to 0} x1n\sin x;(0,\pi)$

69. $\lim_{x\to\infty}\frac{x+1nx}{x1nx};(0,\infty)$

70. $\lim_{x\to\infty}\frac{1nx}{\sqrt{x}};(0,\infty)$.

71. Find the values of a and b in order that $\lim_{x\to 0}\frac{x(1+a\cos x)-b\sin x}{x^3}$, may be equal to 1.

72. Show that if x > 0, then $1+\frac{1}{2}x-\frac{1}{8}x^2\le 1+\frac{1}{2}x$. Using this inequality, approximate the values of $\sqrt{1.2}$ and $\sqrt{2}$, and find the best accuracy.

73. Use Taylor's theorem with n = 2 to obtain more accurate approximations for $\sqrt{1.2}$ and $\sqrt{2}$.

74. If $f(x) = x^2$ for $x \in [0, 4]$, calculate the Riemann Sum with the partition $P = \{0, 1, 2, 4\}$ with the tags at the left end points of the sub interval.

75. If I = [0, 4] in a closed interval calculate norms of the following partitions of I

(a) $P_1 = (0, 1, 2, 4)$

(b) $P_2 = (0, 1, 1.5, 2, 3.4, 4)$

(c) $P_3 = (0, 0.5, 2.5, 3.5, 4)$

(d) $P_4 = (0, 2, 3, 4)$

76. Show that every constant function on [a, b] is Riemann integrable.

77. Show that the function f(x) defined by

$$g(x)=\begin{cases}2 & \text{for } 0\le x\le 1\\ 3 & \text{for } 1<x\le 3\end{cases}$$ is Riemann integrable in [0,3].

78. Use Mean Value Theorem of differentiation to prove that
$\frac{x-1}{x} < \log x < x-1$ for $x > 1$.

79. Use the Substitution Theorem to evaluate the following integrals

(a) $\int_1^4\frac{\sin\sqrt{t}}{\sqrt{t}}dt$ (b) $\int_1^4\frac{\cos\sqrt{t}}{\sqrt{t}}dt$

80. Apply the Second Substitution Theorem to evaluate the integral $\int_1^9\frac{dt}{2+\sqrt{t}}$.

FACULTY OF SCIENCE

B.Sc. II Year (Practical) Examination February 2010

Subject : Microbiology (New Syllabus)

Paper : II

QUESTION BANK

Time : 3 hours} **{Marks : 50**

I. Major Experiment Questions (20 Marks)

1. Test for sugar present in the given sample and identify atleast two sugars and report (The examiner to provide the known and unknown sugar samples to each student along with necessary reagents for testing).

2. Test and identify atleast two amino acids in the given sample by qualitative analysis (The examiner should provide known and unknown amino acid samples to each student and reagents for testing).

3. Plot a standard graph of DNA by calorimetry and find out the amount of DNA present in the given sample. (The examiner to provide unknown samples and necessary reagents).

4. Plot a standard graph of protein by calorimetry using Biuret / Lowry's method and report the quantity of protein present in the given sample. (The examiner to provide samples and reagents to each student).

II. Minor Experiment Questions (10 Marks)

5. Find out the viable count of bacteria by observing the colonies developed on dilution samples inoculated. (The examiner to provide colonies on plates with volume plated and dilution).

6. Take the turbidity readings of culture tubes provided for different time intervals of growing bacterial cultures and plot the growth curve. (The examiner to provide suitable tubes to each student for growth curve).

7. Observe and record the O.D. reading of bacterial culture grown at different pH and given in separate tubes. Find out the optimum pH for bacterial growth by plotting the graph. (The examiner to provide the necessary tubes with culture for turbidometry).

8. The bacterial cultures were grown at different temperatures and samples of the same are given in tubes. Read the growth and find out the optimum temperature for growth by plotting the graph. (The examiner to provide with necessary culture tubes).

9. Amino acids are separated by paper chromatograph and spots are developed. Identify the amino acids present in the mixture by observing the sports and Rf-values. (The examiner to give paper chromatograph with spots developed using known and unknown amino acids).

..2

10. A source sample is provided to you .Test for the starch hydrolysis of the sample by qualitative test. (The examiner to provide with necessary samples and reagents to each student).

11. A culture is provided to you. Demonstrate whether the culture is positive or negative to catalase test. (The examiner to provide with necessary cultures and reagents to each student).

12. A problem related to DNA and RNA characteristics, Transcription and Translation (The examiners can prepare problems to be solved by the students in the exam then and there).

III. Spottings (5 pots) (3 Marks Each)

13. Winogradsky's column with zones of different microbial groups developed.

14. Graphical presentation of the growth curve.

15. Paper chromatography for sugar, amino acids with developed (colour) spots.

16. Sugar fermentation medium with result (positive or negative).

17. Starch agar plates containing colonies tested with iodine.

18. Blood Agar plates

19. Biuret reagent with label

20. Fehlings reagent with label

21. Mac Conkey agar

22. Nutrient agar

23. Mineral Salt medium (with labeling)

24. Bristol's medium (with labeling)

25. Pringstein's medium (with labeling)

26. Colorimeter

27. Bacterial growth turbidity tubes (3 numbers) labeled with different pH or temperatures having difference in turbidity.

28. Graph showing the effect of pH on Bacterial growth.

29. Graph showing the effect of temperature on Bacterial growth .

30. Graph showing the effect of salt on Bacterial growth

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FACULTY OF SCIENCE

B.Sc. II Year (Practical) Examination 2009

Subject : Zoology (New Syllabus)

Paper : II

QUESTION BANK

Time : 3 hours} **{Marks : 50**

Note : Hand over the diagram and procedure before commencement of QI and QII.

I. Major Dissection **(17 Marks)**

Dissect and display the ..... system ..... and draw a neat labelled diagram. Diag : 4 marks
Disst : 13 marks

1. Afferent brachial vessels in Scoliodon
2. Efferent brachial vessels in Scoliodon
3. V & VII Cranial nerves in Scoliodon
4. IX and X Cranial nerves in Scoliodon
5. Arterial system of Calotes

II. Minor Experiment (Ecology) **(10 Marks)**
(Procedure 2 + Experiment 6 + Dissection 2)

6. Determine the pH and carbonates in the given water sample.
7. Estimate amount of carbonates of two water samples A and B.
8. Estimate the amount of carbonates and bicarbonates in the given water sample.
9. Estimate the salinity (chloride) in water samples A and B.
10. Estimate the amount of dissolved oxygen in the given water sample.
11. Estimate the amount of bicarbonates in the water sample A and B.
12. Determine pH and bicarbonates in the given water sample

III. Identify, classify and give reasons for identification : **(5x2=10 Marks)**
(Marks for identification 1/2 mark + classification 1/2 mark + Diagram 1/2 mark + Description 1/2 of classification not applicable identification 1/2 marks + Diagram and Description 1 ½ marks)

Museum Specimens and Slides

13. Herdmania
14. Amphioxus
15. Amphioxus T.S. through pharynx
16. Petromyzon
17. Myxine
18. Pristis

..2

19. Torpedo
20. Channa
21. Pleuronectes
22. Hippocampus
23. Exocetus
24. Echenies
25. Labeo
26. Calta
27. Clarius
28. Anguilla
29. Placoid Scales
30. Cycloid scales
31. Clenoid scales
32. Rhomboid scales
33. Ichllyphis
34. Amblystoma
35. Sirem
36. Axolotl larva
37. Rana
38. Hyla
39. Atyles
40. Draco
41. Chamaeleon
42. Uromastix
43. Russel's viper
44. Naja naja
45. Krait
46. Enhydrina
47. Testudo
48. Trianyx
49. Crocodile
50. Picus
51. Psittacula
52. Eudynamis
53. Bufo
54. Alcedo
55. Ornithorhynchus
56. Tachyglossus

57. Hedge hog
58. Pteropus
59. Funambulus
60. Manis

Osteolgoy (Bones) – 2 **(2 x 2=4)**

61. Humerus of varanus
62. Radius – ulna of varanus
63. Femer of vavanus
64. Tibio-fubula of varanus
65. Pectoral girdle of varanus
66. Pelvic girdle of varanus
67. Humerus of Fowl
68. Radio-ulna of fowl
69. Femur of fowl
70. Tibio-Fibula of fowl
71. Pectoral girdle of fowl
72. Pelvic girdle of fowl
73. Furcula of fowl
74. Humerus of Rabbit
75. Radio-ulna of rabbit
76. Femur of Rabbit
77. Tibio – Fibula of Rabbit
78. Pectoral girdle of Rabbit
79. Pelvic girdle of Rabbit

Embryology – 2 (Slides / Models) **(2 x 2= 4)**

80. Slide of Sperms of Grasshopper / Rat
81. T.S. of Testes of Rabbit
82. T.S. of Ovary of Rabbit
83. 2 – cell stage of Frog
84. 4-Cell stage of Frog
85. 8-Cell stage of Frog
86. Morula of Frog
87. Blastula of Frog
88. Gastrula of Frog

IV. Record **5 Marks**

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PRACTICAL PAPER – II

90 hrs
(3 hrs/week)

CHORDATE, EMBRYOLOGY AND ECOLOGY
(Note use minimal numbers of individuals, and discourage killing of animals)

1. Observation of the following slides / specimens / models:
   Protochordata- *Herdmania, Amphioxus,* T.S through pharynx of *Amphioxus*.
   Cyclostomata – *Petromyzon* and *Myxine*.
   Pisces- *Pristis, Torpedo, Channa, Pleuronectes, Hippocoampus, Exocoetus, Echeneis, Labeo, Catla, Clarius* and *Anguilla*. **Amphibia** - *Ichthyophis, Amblystoma, Siren,* Axolotl larva, *Rana, Hyla* and *Alytes*.
   Reptilia - *Draco, Chamaeleo, Uromastix, Daboia* (Russell's viper), *Naja* (Cobra), *Bungarus* (Krait), *Enhydrina, Testudo, Trionyx* and *Crocodylus* (Crocodile).
   Aves - *Picus, Psittacula, Eudynamis, Bubo* and *Alcedo*.
   Mammalia - *Ornithorhynchus, Tachyglossus, Erinaceus, Pteropus, Funambulus* and *Manis*.

2. Dissections:

(Note use minimal numbers of individuals, and discourage killing of animals)

1. V, VII, IX and X cranial nerves of *Catla, Rohu, Tilapia* or locally available fish (Note: it is illegal to use any elasmobranch/ shark example).
2. Gills and scales of *Catla, Rohu, Tilapia* or locally available fish (Note: it is illegal to use any elasmobranch/ shark example).

OSTEOLOGY

1. Appendicular skeletons of Varanus, Pigeon and Rabbit (Studies should be based on osteological collections already in possession, no animals should be sacrificed for this study).

EMBRYOLOGY
(Note use minimal numbers of individuals, and discourage killing of animals)

1. Mounting of sperms (albino mice or wistar rat).
2. Observations of following slides / models
   a. T.S. of testis and ovary (Rat/ Rabbit/ Human).
   b. Different stages of cleavage (2-cell, 4-cell and 8-cell) and morula.
   c. Blastula and gastrula of frog.

ECOLOGY

1. Determination of pH in a given sample.
2. Estimation of dissolved oxygen in the given samples at different temperatures.
3. Estimation of salinity (chloride) of water in the given samples.
4. Estimation of hardness of water in terms of Carbonates, bicarbonates in the given samples.

REFERENCE BOOKS

1. 'Chordate Zoology' – E.L. Jordan and P.S. Verma. S. Chandu Publications.
2. 'Cell biology. Genetics. Evolution and Ecology'. by P.S. Verma and V.K. Agarwal., S. Chand Publishers.
3. 'Chordata – I' by Mohan P. Arora., Himalaya Publishing House Pvt. Ltd.
4. 'Text book of Zoology – Vertebrates'., by parker and Haswell.
5. 'Text book of chordates' – Kavita Juneja and H.S. Bhamrah.
6. 'A text book of Embryology' – N. Arumugam.
7. 'Chordate Embryology' by P.S. Verma and V. K. Agarwal., S. Chand and Company.
8. 'Developmental Biology – Scott. F. Gilbert.
9. 'Developmental Genetics – G.S. Miglani.
10. 'Embryology' – Mohan P.Arora.
11. 'Elements of Ecology' – Odum.
12. 'Environmental Biology' by H.R. Singh., S. Chand Publications.
13. 'Ecology' –M.P.Arora
14. 'Environmental Biology' – P.D.Sharma
15. 'Environmental Ecology' – P.R. Trivedi and Gurdeep Raj.
16. 'Ecology – Principles and Applications' – J.L Chapman and M.J.Reiss.
17. 'Biology' by Campbell & Reece.
18. Biology: The science of Life; by R.A. Wallace, G.P. Sanders & R.J. Ferl.