FACULTY OF SCIENCE

B.Sc. III YEAR (PRACTICAL) EXAMINATION

SUBJECT : BOTANY

PAPER III

(Cell Biology, Genetics, Ecology and Biodiversity)

QUESTION BANK

Time : 3 Hrs. Max Marks 50

1. Carry out the cytological preparation and staining of the given material and report any TWO stages of cell division to the examiners. 15
(Procedure-3, Slid preparation - 6, Figures - 3, Inference - 3)
   1. Onion root tip squash (Mitosis)
   2. Onion flower buds (Meiosis)

2. Solve the Two given Genetic problems 10
(Working out - 3, Inference - 2, (total for each problem - 5) Total 5x2=10 Marks)

3. When a tall plant is selfed it produced 64 plants, having tall and dwarf phenotypes. How many are tall and how many are dwarf?
4. What will be the result of selfing F_1 generation in a cross when round and yellow seeded pea plants (YYRR) are crossed with green and wrinkled (yyrr) seeded pea plants.
5. When round and yellow seeded pea plants (YYRR) are crossed with green wrinkled (yyrr) seeded plants F_1 are yellow and round seeded plants (YyRr). What will be the result when this F_1 is crossed with round and yellow seeded plants ?
6. In Garden peas tall plant habit 'T' is dominant over dwarf 't' Green pods 'G' over yellow 'g'. Bring out a cross between Tall yellow with dwarf Green and obtain F_1 and F_2 give the percentage of Tall green Homozygous among F_2. Give the F_2 genotypic ratio.
7. In snapdragon Red flower 'R' is incompletely dominant over white 'r' the heterozygous being pink. The normal broad leave 'B' are incompletely dominant over narrow leaves 'b'. The heterozygous being intermediate leaf breadth. Find our the phenotype of the following crosses.
   a. Red flowered broad leaved plant crossed with white flowered narrow leaved plant what will be F_1 and F_2.
8. In a pea plant the allele 'T' for Tallness is dominant over the allele 't' for dwarfness and the allele 'R' for round seeds is dominant over allele 'r' for wrinkled seeds.
   Give the phenotypes of the progeny of the following crosses.
   TtRr x ttrr
   TTRR x ttrr
   TtRr x TtRr

9. In a plant a cross between Red flowered plant and white flowered plant yields plants of both the colours in equal proportion but a cross between two white flowered plants yields only white flowered plants. What could be the genotypes of the parents and which phenotype is recessive ?

10. In pea a tall plant with round seeds is crossed with a dwarf plant having wrinkled seeds.
The progeny obtained is in the ratio of
1 tall plant with round seeds
1 tall plant with wrinkled seeds
1 dwarf plant with round seeds
1 dwarf plant with wrinkled seeds

11. A fully heterozygous grey bodied (B+) normal winged (Vg+) female f_1 of fruit fly was crossed with black bodied (b), vestigial (Vg), male gave the following results.

Grey Normal	-	126
Grey Vestigial	-	24
Black normal	-	26
Black Vestigial	-	124

a) Does this indicate linkage?
b) If so what is the percentage f crossing over ?
c) Diagram the cross showing the arrangement of the genetic markers on the chromosome.

12. The recessive gene 'sh' produces Shrunken Corn kernels and its dominant allele 'sh+' produces full plump kernels. The recessive gene 'c' produces colourless endosperm and its dominant allele (c+) produces coloured endosperm. A pure plum kernels and coloured endosperm is crossed with shrunken kernels and colourless endosperm. The F_1 is crossed with recessive parent and produced the following progeny.

Shrunken coloured	-	149
Shrunken colourless	-	4035
Plump colourless	-	152
Plump coloured	-	4032

a) Does this indicate linkage ?
b) What is the crossing over percentage ?
c) Construct the genetic map.

13. In corn a dominant gene 'C' produces coloured aleurone, its recessive allele produces colourless aleurone. Another dominant gene 'SH' produces full, plump kernels, its recessive alleles 'sh' produces shrunken kernels, de to collapsing of endosperm. A third dominant 'Wx' produces normal starchy endosperm and its recessive allele 'wx' produces waxy starch.
A homozygous plant form a seed with colourless, plump and waxy endospermis crossed t a homozygous plant from a seed with coloured, shrunken and starchy endosperm.

The F_1 is test crossed to a colourless, shrunken, waxy stain. The progeny seed exhibit the following phenotypes.

1.	Colourless, shrunken, starchy	-	113
2.	Coloured, plump, waxy	-	116
3.	Coloured, shrunken, waxy	-	601
4.	Colourless, full, starchy	-	626
5.	Colourless, plump, waxy	-	2708
6.	Coloured, shrunken, starchy	-	2538
7.	Colourless, shrunken, waxy	-	2
8.	Coloured, plump, starchy	-	4

a. Construct a genetic map of this region of Chromosome.
b. Calculate the coefficient of coincidence.

14. A kidney-been shaped eye is produced b a recessive gene 'k' on the third chromosome of Drosophila. Orange eye colour called, 'cardinal' is produced by the recessive gene 'cl' on the same chromosome. Between those two loci is a third locus with a recessive allele 'e' producing ebony body colour. Homozygous kidney, cardinal females are mated to homozygous ebony males. The tri-hybrid F_1 females are then test crossed to produce the F_2. Among 4000 F_2 progeny are of the following.

1761	Kidney, cardinal	97	kidney
1773	Ebony,	89	ebony, cardinal
128	Kidney, ebony	6	kidney, ebony, cardinal
138	Cardinal,	8	Wild type

a) Determine the linkage relationship in the parents and F_1 tri-hybrid.
b) Estimate the map distances.

15. In four-o-clock plant, red flowers colour 'R' is incompletely dominant over white 'r', te heterozygous plant being pink flowered. If a red flowered four-o-clock plant is crossed with a white flowered one, what will be the flower colour of the F_1, of the F_2, of the offspring of a cross of the F_1 with its red parent, with its white parent.

3. Carry out analysis of the water sample and estimate the amount of carbonates and bicarbonates.
(Analysis - 3, Results and inference - 2) 5

16. Estimation of carbonates in polluted and unpolluted water
17. Estimation of Bicarbonates in polluted and unpolluted water.

OR

18. Determination of Soil Texture and soil pH (Soil Texture - 3, pH-2)

4. Critical notes on (FIVE) spotters of scientific interest. 10
(Identification - 1, Notes - 1) 5x2=10

Specimens

19. Eicchornia
20. Hydrilla
21. Pistia
22. Nymphaea
23. Vallisnaria
24. Asperagus
25. Aloe vera
26. Euphorbia antiquorum
27. Opuntia
28. Casuarine
29. Nerum leaf
30. Rhizophora
31. Avecenia

Slides

32. Hydrilla stem TS
33. Nymphaea petiole TS
34. Vallisnaria leaf TS
35. Asperagus cladode TS
36. Nerium leaf TS
37. Casuarina stem TS
38. Rhizophora pnematophore TS
39. Avecenia leaf TS

5. Viva-voce (Interactive testing) 5
6. Record 5

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MODEL QUESTION PAPER & SCHEME FOR VALUATION

B.Sc BOTANY

Practical Paper-III: Cell Biology, Genetics, Ecology and Biodiversity

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

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1. Carry out the cytological preparation and staining of the given material and report **any TWO** stages of cell division to the Examiners **15 Marks**

   Scheme for valuation: procedure – 3 + Slide preparation - 1 + Observation or recording of results (figures)–3 + Inference –3

2. Solve the **TWO given** Genetics Problems: **10 Marks**

   Scheme for valuation for each problem: Solution 3 + Inference – 2

3. Ecology: Carry out analysis of the water sample and estimate the amount of Carbonates and Bicarbonates : Analysis – 3 + Results and Inference – 2 **(Total 5 Mark)**

4. Critical notes on (FIVE) spotters of scientific interest: **10 Marks**

   Identification – 1 Mark + Notes - 1

5. Viva-voce : **5 Marks**

6. Record **5 Marks**

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Code No.

FACULTY OF SCIENCE
B.Sc. III Year (Practical) Examination

Subjeet : BOTANY (NEW SYLLABUS)

Paper – IV

(Physiology, Tissue Culture, Biotechnology, Seed Technology and Horticulture)

QUESTION BANK
[Effective from the Academic year 2010-2011]

Time : 3 Hours] [Max. Marks: 50

Note : Answer **All** questions. Draw well labeled diagrams wherever necessary.

I. Conduct the Physiology experiment (A) allotted to you Write procedure, Give results and inference.(Procedure - 3 marks + Experimentation – 6 marks + Observations or recording of results – 3 marks + Inference – 3 marks)

15 Marks

1. Determination of osmotic potential of vacuolar sap by plasmolytic method using leaves of *Rhoeo Tradescantia*.
2. Determination of rate of transpiration using cobalt chloride method.
3. Determination of stomatal frequency using leaf epidermal peelings/impressions.
4. Determination of catalase activity using potato tubers by titration method.
5. Separation of chloroplast pigments using paper chromatography technique.
6. Estimation of protein by Biuret method.

II. Conduct the tissue culture/ biotechnology/seed technology experiment (B) allotted to you and write the procedure (*Preparation* – 5 marks + Identification - 3 marks + Discussion – 2 marks).
10 Marks

7. Preparation of plant tissue culture medium (basal medium- MS medium).
8. Demonstration of micro propagation using explants like axillary buds and shoot meristems (inoculation of explants).
9. Isolation and estimation of DNA.
10. Testing of seed viability using 2, 3, 5-triphenyl tetrazolium chloride (TTC).
11. Demonstration of seed dressing using fungicide to control diseases.

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12. Demonstration of seed dressing using biofertilizer (*Rhizobium*) to enrich nutrient supply.

III. Describe the given horticultural experiment (C) allotted to you. Give procedure.

(Procedure – 2 marks + Identification – 1 mark + analysis – 2 marks) **5 Marks**

13. Demonstration of vegetative plant propagation (Rooting of cuttings – Leaf and Stem / layering /
budding / wedge grafting)

14. Study on the application of plant growth regulator (IBA) for rooting of cuttings using ornamental
Plant.

IV. Critical notes on 5 spotters (Specimen / photograph / Equipment / sketch without labeling) - **D, E, F, G & H :** (Physiology-1, Tissue culture, Biotechnology-2, Seed Technology, Horticulture-2) (Identification – 1 mark + Notes – 1 mark for each spotter) **2X5 =10 Marks**

D – PHYSIOLOGY

15. Plasmolysed Cell
16. Stomatal opening & closing
17. Catalase activity-enzyme concentration
18. Catalase activity-substrate concentration
19. Catalase activity-temperature
20. Chromatogram & Rf

E&F – TISSUE CULTURE & BIOTECHNOLOGY:

21. Laminar flow hood
22. Incubator
23. Autoclave
24. Culture medium
25. Micropropagation
26. Explants
27. Callus
28. Somatic embroys
29. Antibiotics
30. Vaccines
31. Biofertilizers (Rhizobium)
32. Single Cell Protein
33. Transgenic plants
34. Multiple shoots
35. Artificial Synthetic seeds

G&H – SEED TECHNOLOGY & HORTICULTURE:

36. Seed viability
37. Seed dressing
38. Shade net
39. Glass house
40. Mist chamber
41. Cutting
42. Layering
43. Budding

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4. Grafting

V. Viva-Voce : 5 Marks

VI. Record(s) 5 Marks

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MODEL QUESTION PAPER & SCHEME FOR

VALUATION B.Sc. BOTANY

Practical Paper - IV: Physiology, Tissue Culture, Biotechnology, Seed Technology and Horticulture

Time: **3 hours** Maximum Marks: **50**

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1. **Conduct the Physiology experiment (A) allotted to you. Give procedure, results and inference.**

   Scheme for valuation: Procedure – 3 marks + Experimentation – 6 marks + Observations or recording of results – 3 marks + Inference – 3 marks (*Total: 15 Marks*).

   5 Marks

2. **Conduct the tissue culture/ biotechnology/ seed technology experiment (B) allotted to you and write the procedure:**

   Scheme for valuation: Preparation – 5 marks + Identification - 3 + Discussion – 2 marks

   (*Total: 10 Marks*) **10 Marks**

3. **Describe the given horticultural experiment (C) allotted to you. Give the procedure.**

   Scheme for valuation: Observation - 2 marks + Identification – 1 mark + analysis – 2 marks

   (*Total: 5 Marks*) **5 Marks**

4. **Critical notes on 5 spotters – D, E, F, G & H :**

   (Physiology-1, Tissue culture, Biotechnology-2, Seed Technology,Horticulture-2)

   Scheme of valuation: Identification – 1 mark + Notes – 1 mark for each spotter

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[illegible]

[illegible] 10 Marks

5. Viva-Voce : 5 Marks

6. Record(s) 5 Marks

FACULTY OF SCIENCE

B.Sc. III Year (PRACTICAL) Examination
(with effect from Annual 2010- 2011)

Subject: Chemistry (New Syllabus)

Paper-III

QUESTION BANK

Time: 3 Hours Max. Marks: 50

I.(a) Write a brief procedure with Chemical equations for the preparation of an Organic Compound from the list given below : (5 marks)

1. Nitro Benzene
2. P-Bromo acetanilide
3. P-Nitro acetanilide
4. 2, 4, 6 Tri bromo phenol
5. Phenyl azo β-napthol
6. Benzoic acid
7. m-nitro aniline
8. methyl p-nitro Benzoate
9. β-Napthyl methyl ether
10. Benzanilide
11. Benzilidin aniline

(b) Prepare and submit the crude sample of Organic compound from the list given below : (10 marks)

1. Nitro Benzene
2. P-Bromo acetanilide
3. P-Nitro acetanilide
4. 2, 4, 6 Tri bromo phenol
5. Phenyl azo β-napthol
6. Benzoic acid
7. m-nitro aniline
8. methyl p-nitro Benzoate
9. β-Napthyl methyl ether
10. Benzanilide
11. Benzilidin aniline

II. Identify the functional group present in given Organic compound. Report its nature, melting point / Boiling point, solubility and functional groups tests. Prepare a solid derivative and submit. (25 marks)

1. Benzaldehyde
2. Aceto phenone
3. Benzo phenone
4. β-Napthol / α-Napthol
5. O-Cresol
6. Phenol
7. Benzoic acid
8. Aniline
9. Toluidine
10. Acetaldehyde
11. Glucose
12. Benzamide
13. Urea

III. Viva on : (5 marks)

1. Identification of functional groups
2. Separation of two component mixtures
3. TLC and column chromatography

IV. Record (5 marks)

Note : Under Question number II, Six Compounds are given in the question paper out of which examine must choose minimum of four compounds.

Scheme of Valuation

Subject : Chemistry

Paper – III

1.(a)	Brief procedure with chemical equations for the preparation of the given organic compound.	(3+2 marks)
(b)(i)	Preparation and submission of crud sample.	(5 marks)
(ii)	Quality of the crude sample.	(5 marks)
2.	Identification of Organic Compound	
	(a) Ignition Test	(2 marks)
	(b) Physical constant m.p/b.p	(2 marks)
	(c) Solubility (5 solvents)	(5 marks)
	(d) Functional group Tests (minimum two tests 2x6)	(12 marks)
	(e) Solid derivative	(4 marks)
3.	Viva	(5 marks)
4.	Class work & record	(5 marks)

Total : 50 marks

FACULTY OF SCIENCE

B.Sc. III Year (PRACTICAL) Examination
(with effect from Annual 2011)

Subject: Chemistry (New Syllabus)

Paper-IV

QUESTION BANK

Time: 3 Hours Max. Marks: 50

I. The following experiments are for principle and brief procedure writing :

1. Verify the Freundlich adsorption isotherm for adsorption of Acetic Acid on animal charcoal.
2. Determine the solubility and solubility product of $BaSO_4$ by conductance measurement of its solution.
3. Determine the dissociation constant Ka of Acetic Acid by its conductivity measurements.
4. Determine the surface tension of the given liquid at room temperature (density and surface tension of water are given).
5. Determine the viscosity of the given liquid at room temperature (density and surface tention are given).

II. Carry out one experiment allotted from the following :

Kinetics :

6. Determine rate constant for the acid catalysed hydrolysis of methylacelate at room temperature.
7. Determine the order of reaction and calculate the rate constant from a kinetic study of Fe^{3+} catalysed decomposition of H_2O_2 at room temperature.
8. Find the order and rate constant of saponification of ethyl acetate from a kinetic study at room temperature.

Distribution:

9. Prove that Benzoic Acid exists as a dimmer in Toluene by graphical method from a study of its distribution between Toluene and water and determine its partition coefficient.
10. Determine the partition coefficient of Iodine from a study of its distribution between carbon tetrachloride and water.

Instrumentation :

11. Determine the strength of the given HCl solution by conductometric titration against a standard NaOH solution.

12. Determine the strength of the given Acetic Acid solution by conductometric titration against a standard NaOH solution.

13. Calculate the concentration of given $KMnO_4$ solution from a study of verification of Beers Law of $KMnO_4$ solution by colorimetric method.

14. Determine the redox potentials of Fe^{2+} / Fe^{3+} by potentiometric titration of ferrous ammonium sulphate against potassium dichromate.

15. Determine the dissociation constant of Acetic Acid by pH metric titration with strong base NaOH.

16. Calculate the concentration of given $K_2Cr_2O_7$ solution from a study of verification of Beer's law of $K_2Cr_2O_7$ solution by colorimetric method.

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Scheme of Valuation

Subject : Chemistry

			Marks
1.	Principle and procedure with necessary equations	-	5
2.	Five sets of experimental readings (for kinetics and distribution experiments) and twelve experimental readings (for instrumentation experiments) with proper tabulation	-	10
3.	Calculations and results	-	8
4.	Graph	-	7
5.	Record and class work	-	5
6.	Viva	-	5
7.	Project work evaluation	-	10

Faculty of Science
B.Sc(Computer Science): III Year
Practical Question Bank - D B M S
Section-A (SQL)

Employee Database

An Enterprise wishes to maintain a database to automate its operations. Enterprise is divided into certain departments and each department consists of employees. The following two tables describes the automation schemas

Dept (deptno, dname, loc)
Emp (empno, ename, job, mgr, hiredate, sal, comm, deptno)

1. Find out the details of top 3 earner of company.
2. Display those managers name whose salary is more than average salary of his employees.
3. Display those employees who joined the company before 15th of the month?
4. Display the manager who is having maximum number of employees working under him?
5. Print a list of employees displaying 'less salary' if less than 1500 if exactly 1500 display as 'Exact salary' and if greater than 1500 display 'more salary'?
6. Update the employee salary by 15%, whose experience is greater than 10 years.
7. Delete the employees, who completed 30 years of service.
8. Determine the minimum salary of an employee and his details, who joined on the same date.
9. Determine the count of employees, who are taking commission.
10. Create a view, which contain employee names and their manager names working in sales department.
11. Determine the names of employee, who earn more than their managers.

12. Determine the names of employees, who take highest salary in their departments.

13. Determine the employees, who are located at the same place.

14. Determine the employees, whose total salary is like the minimum Salary of any department.

15. Determine the department which does not contain any employees.

Section-B (PL/SQL)

1. Write a Pl/Sql program to raise the employee salary by 30%, who have completed their 40 years of service.

2. Write a Pl/Sql program to check the given number is Armstrong 'or' not.

3. Write a Pl/Sql program to display top 10 rows in emp table based on their job and salary.

4. Write a Pl/Sql program to swap two numbers without using third variable.

5. The hrd manager has decided to raise the employee salary by 20%. Write a Pl/Sql block to accept the employee number and update the salary of that employee. Display appropriate message based on the existence of the record in emp table.

6. Write a Pl/Sql program to generate multiplication tables for 3 & 7.

7. Write a Pl/Sql program to display ~~sum of prime numbers and sum of composite numbers in the given range.~~

8. Write a Pl/Sql trigger on the emp table when ever an update is performed on the emp table.

9. Write a Pl/Sql program to raise the employee salary by 10%, for department number 30 people and also maintain the raised details in the raise table.

10. Write a procedure to update the salary of employee, who are not getting commission 9%.

11. Write Pl/Sql program to check the given string is palindrome or not.

12. Write a Pl/Sql procedure to prepare an telephone bill by using following table. And print the monthly bills for each customer

Table used : phone.

Name	null?	Type
Tel_no	not null	number(6)
Cname		varchar2(20)
City		varchar2(10)
Pr_read		number(5)
Cur_read		number(5)
Net_units		number(5)
Tot_amt		number(8,2)

13. Write a procedure to update the salary of employee, who belongs to marketing department with a 15% percentage of raise.

14. Write a Pl/Sql procedure to prepare an electricity bill by using following table

table used: elect

name	null?	Type
mno	not null	number(3)
cname		varchar2(20)
cur_read		number(5)
prev_read		number(5)
no_units		number(5)
amount		number(8,2)
ser_tax		number(8,2)
net_amt		number(9,2)

15. Write a Pl/Sql program to retrieve data from emp table using cursors.

B.Sc(ComputerScience) III Year

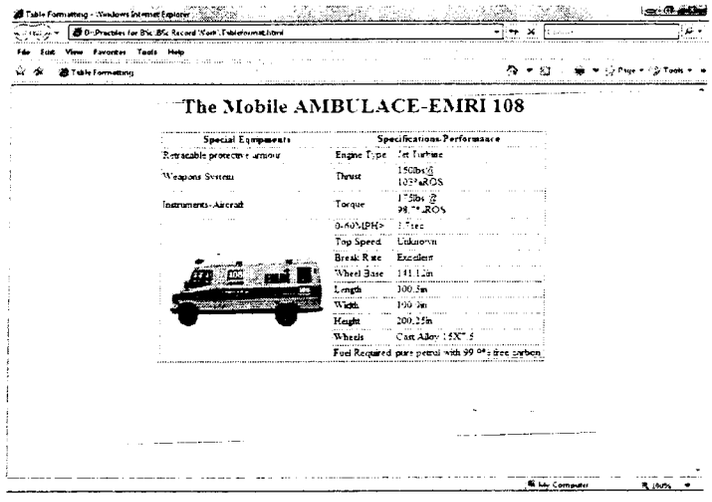
Practical Paper- IV

(Elective-1)

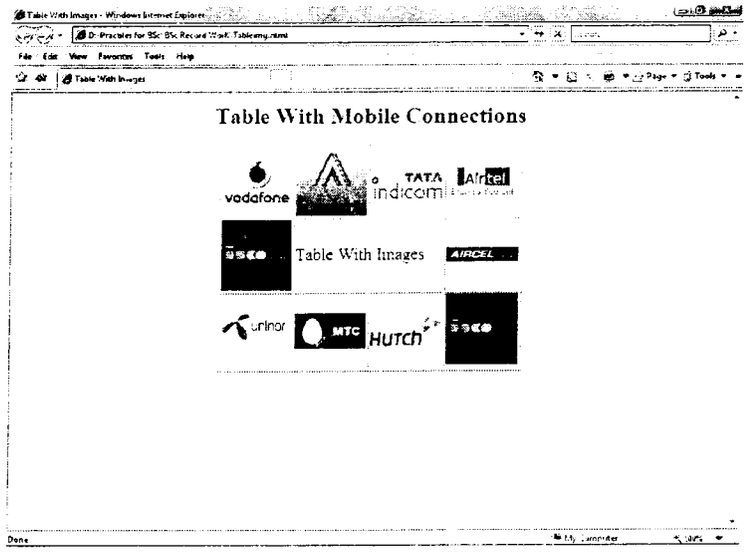
Web Technologies Lab

Lab Cycle

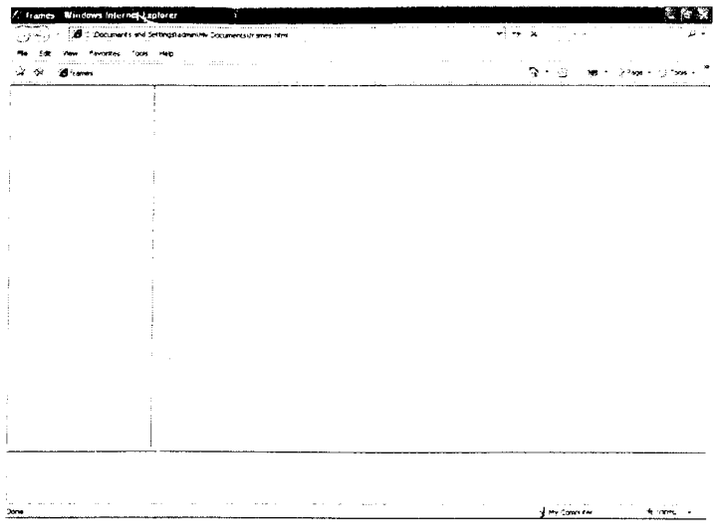
1. Create a web page illustrating text formatting tags.
2. Create a web page to demonstrate font variations.
3. Prepare a sample code to illustrate three types of lists in HTML.
4. Using Nested tables create your Curriculum Vita.
5. Create a form that accepts the information from the subscriber of a mailing system.
6. Design the page as follows:



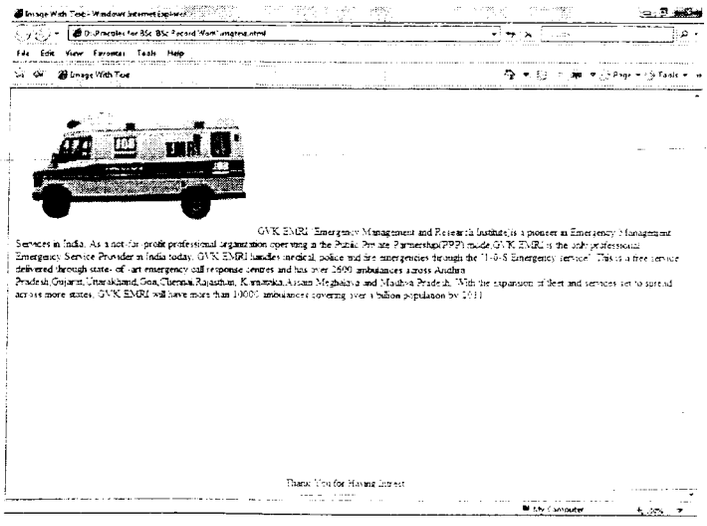
7. Using Table related tags align the images



8. Using Frames Divide the web page as follows

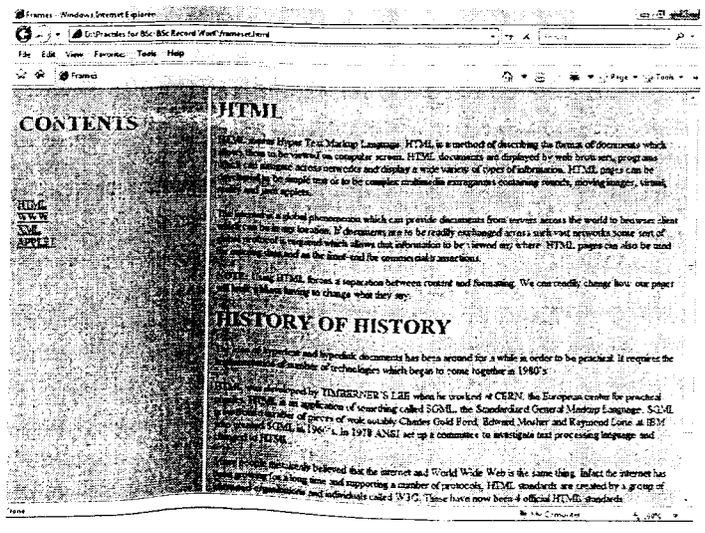


9. Design The page as follows



10. Illustrate with example the horizontal rulers in your page.

11. Explain hyper link example with target attribute as follows.



12. Create a java script program to accept the first, middle, last names of user and print them.

13. Evaluate the following :
    a. "10 "+ " 20"
    b. (10<8)?10:8
    c. J=(i++)+(--i)+(++i)+(i++) where i=2

14. Write a java script program to add two numbers.
15. Write a java script program to find the factorial of given number.
16. Write a java Script program to print all prime numbers.
17. Write a java script program to sort the array (Bubble Sort).
18. Write a java script program to evaluate the following mathematiccal Expression
    1+2/2!+3/3!+.....+n/n!.
19. Write a java script program to implement Stack methods in an Array.
20. Write a java script program to "Wish a user " at different hours of a day.
21. Prompt a user for the cost price and selling price of an article and output the profit and loss percentage.
22. Create a we page of customer profile for data entry of customer a in Hotel, The profile should include Name, Address, Age, gender, Room Type (A/C, Non-A/C or Deluxe), Type of payment (Cash, Credit/Debit Card or Coupons).
23. Create a Online Bio-Data Form for the Current Employees in the organization.
24. Design the simple Calculator.
25. Write DHtml program to give different colors for different heading tags.
26. Using CSS invert the behavior of the <h1> to <h6> tags.
27. Create a sample code to illustrate the Inline style sheet for your web page.
28. Create a sample code to illustrate the External style sheet for your web page.
29. Create a sample code to illustrate the embedded style sheet for your web page.
30. Create a sample code to illustrate the procedure of creating user defined classes in CSS.

Faculty of Science

B.Sc (Computer Science) III Year

Practical Paper – IV Examination 2011

Visual Basic Lab (Elective – 2)

Question Bank w.e.f. Annual 2011

Time : 3 Hrs. Marks : 50

1. Develop a Visual Basic (VB) Application to display the profile of a valid User. Apply conditions:
   a. Check the User with Password
   b. Display the user profile (Profile is one of Read, Write, Read and Write) (Assume your own format)
2. Develop a VB application to search an item from the list of items using Binary Search method.
3. Develop a VB application for Queue Operations.
4. Develop a VB application for Stack Operations.
5. Develop a VB application to copy one list elements to another list and vice-versa.
   Note: No duplicate elements are allowed in the list.
6. Develop a VB application to make survey on different age group then display the total people under each group. (Assume your own age groups and display the totals group wise)
7. Develop a VB Calculator application.
8. Develop a VB application to sort the list of numbers.
9. Develop an VB application to read and print address of a person using input box.
10. Develop an application form to read user profile. Contents are:
    - Skills in different subjects (OS, Databases, Web Technologies, Prog. Languages) using combo box and experience. Any candidate can choose a maximum of skills in any 3 subjects.
11. Develop a VB application to generate Electricity Bills (Inputs : Meter No., Customer Name, Previous Reading, Current Reading. Output: Units Consumed, Avg. Unit Price, Total Charges, Surcharge, Grand Total).
12. Develop a VB program to generate alphabet pyramid. Eg.

    A
    BCB
    CDEDC

13. Develop a VB application to print Student Marks Statement. Inputs : Roll No., Student Name, Course studying, Name of Examination, Marks in 3 subjects. Outputs: Total Marks, Average Marks, Result (I/II/III/Fail) based on the marks scored. Apply your own conditions and Marks statement format.
14. Develop a VB application program to simulate the traffic signals, by using following conditions.
    a. Form controls of three signals RED, YELLOW and GREEN in an order of column wise.
    b. Form controls of one timer label, to display the time out of the signal
    c. While transforming the signal from RED to GREEN, signal travel to YELLOW signal.
    d. Time out for RED signal is 180 Secs., GREEN signal is 120 Secs., YELLOW is 60 Secs.

15. Develop a VB application to implement the Key events as specified below. All the active controls of the form should navigate through the key events like KEY PRESS, LOST FOCUS, GOT FOCUS.

CONTROL NAME	SPECIFICATION	CONDITIONS
Text Box	Student Name	
Text Boxes 6	Five subject marks.	Should be numbers, and not null
Text Box	Total Marks of 5 subjects	Should not be null, -ve, string and only +ve numbers
Command buttons 2	1.Calculate Total Marks and display. 2. To clear form control values	

16. Develop a VB application to display menu options with Main and Submenu options.
17. Develop a VB application to demonstrate the MDI forms.
18. Develop a VB application to perform on-line examination (use database)
19. Develop a VB application to do the following operations using EMPLOYEE database.
    a. Insert employee details b. Delete employee details
    c. Update employee details d. Search employee details
20. Develop a VB application with different specifications and conditions.
    a. Provide 2 types of users like Administrator and Ordinary user.
    b. The Administrator can do insert, delete, update, searching, navigating and Report generation of records.
    C .The Ordinary user can search records, navigating records and report generation.

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(Elective – 3)

Operating Systems Lab

w.e.f. Annual 2011

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

Note : Answer any ONE question.

1. List all files in current directory and save the list in a file ABC. Also save the
   a. contents of the files in ABC and display the contents in ABC in sorted order.
   b. Display all the users currently logged in detail with column headers.
2. Write a shell script to display the number of lines in each of the text file in given directory.
3. To display all users currently logged in & also check a particular user every 30 seconds until he logs in.
4. Write a script accept a file name and check whether it is directory or file and display the contents?
5. Write a shell script to accept a file name, if it is directory display its files and sub directories in it.
6. Write a shell script to find largest of three numbers using conditional execution operators.
7. Write a shell script to check whether the number is perfect or not.
8. Write a shell script demonstrate break and continue
9. Write a shell script to display reverse numbers from a given argument list
10. Write a shell script display the factorial value from given argument list
11. Write a shell script for concatenation of two strings using arguments
12. Write a shell script to display the mathematical table
13. Write a shell script to print the following

```
*
**
***
****
*****
```

14. Write a shell script to generate Fibonacci series.
15. Write a shell script to find sum of digits in a given number
16. Write a shell script to check whether a given number is prime or not.
17. Write a shell script to accept a string and calculate number of Vowels, consonants and digits in it
18. To input a number and test whether it is +ve, -ve or zero.
19. To display particular messages depending on the weekday.
20. To display common messages for following group of days-Monday & Wednesday, Tuesday & Thursday and Friday & Saturday and other day.

contd..2

21. To wish 'Good Morning' & 'Good Evening'.
22. To accept a string from the terminal and echo a suitable message if it doesn't have at least 9 characters.
23. Demonstration of the following commands
    - Who
    - Pwd
    - Head
    - Tail
    - Chmod
24. Write a shell script for the following menu driven program
    a) Display the current directory path
    b) Display today date
    c) Display users who are connected to the Unix System
25. Write a shell script for the following menu driven program

MENU

1. Currently logged in users
2. present working directory
3. Display system date and time

26. Write a shell script to accept two numbers and perform all arithmetic operations on it.
27. Write a shell script rename all files whose names end with. c as. old

    (For example example. c file should be renamed as example. old)
28. To implement the FCFS algorithm
29. To implement the shortest Job First Algorithm
30. Write a program to implement the Fork() function.

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Faculty of Science

B.Sc (Computer Science) III Year

Practical Paper – IV Examination 2011

MY SQL, and PHP Lab (Elective – 4)

Question Bank w.e.f. Annual 2011

Time : 3 Hrs. Marks : 50

I The enterprise wishes to maintain the details about their suppliers as for the following.

SUPPLIERS(sid: Integer, sname: string, address: string)
PARTS(pid: integer, pname: string, color: string)
CATALOG(sid: integer, pid: integer, cost: real)

The catalog lists the prices charged for different parts by different suppliers.

Develop the queries using **MY SQL**.

1. Find the pnames with their corresponding supplier.
2. Find the snames and their corresponding supplying parts.
3. Find the snames of suppliers who supplies red parts .
4. Find the pnames of parts supplied by LONDON suppliers.
5. Find the sid's of suppliers who charge more than avg cost of that part.
6. For each sid part and find sname, cost corresponding .
7. Find the sid's of suppliers who supply only red parts.
8. Find sid's of suppliers who supplies red and green parts.
9. Find the total amount to pay for the supplier for the parts located at London.

II An organization wishes to maintain the status of working hours of employees. Maintains the following tables.

EMP(eid: integer, ename: string, age: integer, salary: real)
WORKS(eid: integer, dept_id: integer, pct_time: integer)
DEPT(dept_id: integer, budget: real, mng_id: integer)

Note: Employee can work at more than one department, the pct_time field shows the percentage of time worked in the respective department.

Develop **MY SQL** queries for the following statements using above tables.

10. Print the names and ages of each employee who works in both Hardware and Software department.
11. For each department with more than 20 employees in the department, group by dept_id's and number of employees work in that department.
12. Print employee names, whose salary exceeds the budget of their department.
13. Find the mng-id's of managers who manages their departments with budgets greater than Rs. 1,00,000.
14. Find the names of managers who manage the departments with largest budget.

15. Find the mng_id's who controls more than Rs. 5,00,000/- budget, who works with more than one department.
16. Find the mng_id of managers who control the department with highest amount.
17. Find the average manager salary.

III Develop the following using PHP.

18. Write a PHP program to display " Hello ".
19. Write a PHP program to display today's date.
20. Write a PHP program to read the employee details (assume your own details).
21. Write a PHP program to prepare the student marks list(assume your own details for one student).
22. Write a PHP program to generate the multiplication of 2 matrices.
23. Develop a PHP application to demonstrate the college website (assume your own 3 page contents i.e. Home and Internal pages).
24. Develop a PHP application to add rows in a table.
25. Develop a PHP application to modify rows from a table.
26. Develop a PHP application to delete rows from a table.
27. Develop a PHP application to fetch the tows in a table.
28. Develop a PHP application to perform User Registration process.
29. Develop a PHP application to perform User details insertion.
30. Develop a PHP application to monitor the following transactions:
    a. Number of logged in
    b. Time spent on each login.
    c. Delete the user if it spent more than 100 hrs of transaction.

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FACULTY OF SCIENCE

B.Sc. III Year (PRACTICAL) Examination

(With effect from Annual 2011)

Subject: Electronics (New Syllabus)

Paper-III :Digital Electronics & Microprocessor Lab

QUESTION BANK

Time: 3 Hours Max. Marks: 50

Note : 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.**

A – Digital Experiments

1. Verify the truth tables of OR, AND, NOT, NAND, NOR, X-OR logic gates of TTL 7400 series IC's.
2. Construct and verify the truth tables of logic gates using NAND and NOR logic gates.
3. Construct and verify the truth tables of RS, D and JK Flip Flops using IC's.
4. Construct and verify the count table (Truth Table)of Decade counter using 7490 IC.
5. Verify the action of stepper motor interface using a JK Flip Flop.
6. Construct a Half Adder and Full Adder circuits and verify their truth tables.
7. Using appropriate electronic simulation circuit construct a 4 bit parallel adder and study its working.
8. Simulate a Decade counter using JK Flip Flops and verify its count table (Truth Table).
9. With the help of simulation software construct an up / down counter using JK Flip Flop and study its performance.
10. Simulate an up /down Hex counter using 7493 IC and verify its performance.

B – Micro Processor (Software)

11. Write an ALP and Flow chart to perform 8 bit decimal addition of two numbers stored in consecutive memory locations.
12. Write an ALP and flow chart that performs 16 bit addition of the 16 bit numbers stored in register pairs DE and HL.
13. Write an ALP and flow chart to multiply two numbers 08_H and 05_H.
14. Write an ALP to divide 14_H by 05_H.

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15. Write an ALP that picks up smallest of 5 numbers stored in consecutives memory locations and stores the result in the next memory location.

16. Write an ALP that picks up largest of 10 numbers stored in consecutive memory locations.

17. Write an ALP that arranges the given set of 10 numbers stored in consecutive memory locations in ascending order.

18. Write an ALP that arranges the give set of 10 numbers stored in consecutive memory locations in descending order.

19. Write an ALP and flow chart to subtract two numbers stored in consecutive memory locations and store the result in next memory location.

20. Write an ALP and flow chart to generate a time delay of 10m secs. Show the delay calculations.

21. Construct an R-2R ladder network 4 bit D/A converter and verify its working.

22. Write an ALP to rotate a stepper motor both clockwise and anticlockwise through a known angle.

23. Interface a seven segment display to a µp to study its performance.

24. Construct an A/D converter by interfacing it to the µp for temperature measurement.

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15/12/2016

FACULTY OF SCIENCE

B.Sc. III Year (PRACTICAL) Examination
(with effect from Annual 2011)

Subject: Electronics (New Syllabus)

Paper-IV(a):Embedded Systems and Applications

QUESTION BANK

Time: 3 Hours Max. Marks: 50

Note : 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.**

A : Programs using 8051 Kit

1. Write an assembly language program to accept two numbers into register and perform arithmetic Addition and Subtraction.

2. Write an assembly language program to perform arithmetic Addition and Subtraction when data are stored at a memory location.

3. Illustrate 2's complement method of subtraction, by a suitable program.

4. Write an assembly language program to access two numbers from memory locations 50d and 51d respectively, find their product using MUL instruction and store the result as 52d.

5. Write an assembly language program to find the product of two numbers by counter method and verify the result with MUL instruction.

6. Write an assembly language program to access two numbers from two successive memory locations, and perform division using DIV instruction and store the result at the next consecutive locations.

7. Write an assembly language program to find the quotient and the remainder when a number is divided by another using counter method of repeated subtraction and verify the result using DIV instruction.

8. Write an assembly language program to pick the smallest of 10 numbers of a series.

9. Write an assembly language program to pick the largest among the series of 10 numbers.

10. Write a program to arrange the series of numbers in ascending order.

11. Write a program to arrange the series of numbers in descending order.

12. Write a program to generate some time delay, also verify the result theoretically.

13. Write a program to generate some time delay, also verify using CRO.

14. Program the Timer 0/1 in mode 2 to generate some time delay.

15. Program the Timer 0/1 in mode 1 to generate some time delay.

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B: Interfacing – Hardware Experiments

16. Interface an ADC and a temperature sensor, and measure the temperature by a suitable program.

17. Interface a DAC and generate a stair case wave form.

18. Write a program to flash a LED connected at an output port.

19. Write a program to flash a LED connected at an output port and switch it off after some delay.

20. Write a program to toggle a LED connected at an output port, alternatively.

21. Write a program to generate a square wave with 50% duty cycle and interface the CRO at an output terminal and verify the same.

22. Write a program to rotate a stepper motor either in clockwise or anti clockwise direction.

23. Interface a stepper motor and rotate it through 180°clock wise and then anti clock wise.

24. Write a program to interface a stepper motor and rotate it in the clockwise direction through 270°.

25. Write a program to interface a stepper motor and rotate it in the anti clockwise direction through 270°.

C: Programs using Keil software

26. Write an assembly language program to perform arithmetic Addition and Subtraction when the data are stored at a memory location.

27. Write a program to find the sum 'n' natural numbers. Take n =5.

28. Write an assembly language program to access two numbers from memory locations 50d and 51d respectively, find their product using MUL instruction and store the result at 52d.

29. Write an assembly language program to fined the product of two numbers by counter method and verify the result with MUL instruction.

30. Write an assembly language program to access two numbers from two successive memory locations, and perform division using DIV instruction and store the result at the next consecutive locations.

31. Write an assembly language program to pick the smallest of 10 numbers of a series.

32. Write an assembly language program to pick the largest among the series of 10 numbers.

33. Write a program to arrange the series of numbers in ascending order.

34. Write a program to arrange the series on numbers in descending order.

35. Write a program to generate a rectangular waveform at a specified port terminal.

FACULTY OF SCIENCE

B.Sc. III Year (PRACTICAL) Examination
(with effect from Annual 2011)

Subject: Electronics (New Syllabus)

Paper-IV(b):Digital Design Using VHDL

QUESTION BANK

Time: 3 Hours Max. Marks: 50

Note : 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. Write a VHDL code for Half Adder using Data flow modeling.
2. Write a VHDL code for Half adder using structural style of modeling.
3. Develop the schematic model for Half adder and implement it.
4. Develop a data flow model for Full adder.
5. Write a VHDL code for full adder using structural modeling style.
6. Synthesize and implement the full adder using schematic.
7. Write a data flow model of a Half subractor and implement the design.
8. Synthesize and implement the Half subtractor using structural modeling.
9. Draw the schematic of Half subtractor and synthesize it.
10. Develop the VHDL code for Full substractor data flow model.
11. Write a VHDL code for Full subtractor in structural model.
12. Using schematic, synthesize and implement the Full subtractor.
13. Develop a VHDL code for a 2-control input MUX using case Statement.
14. Using conditional signal assignment statement write the VHDL code for 2 control input MUX.
15. Write VHDL code for 2 control input MUX using selected signal assignment statement.
16. Develop a VHDL model for 2 control input DEMUX using case statement.
17. Using schematic style of modelling synthesize BCD-seven segment decoder.
18. Model the R-S flip flop by using assertion statement, a different levels of severity.
19. Model of BCD counter – using top level behavioural.
20. Write a Test bench for Half adder.
21. Write a Test bench for full adder.

FACULTY OF SCIENCE

B.Sc. III Year (Practical) Examination

Subject: PHYSICS (New Syllabus)

Paper – III
Electricity, Magnetism and Electronics

QUESTION BANK
w.e.f. Annual 2011

Time: 3 Hours Max.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 to the candidate.

1. Compare two nearly equal resistances using *Carey Foster Bridge* and determine the specific resistance of the material of a given wire.
2. Determine internal resistance of a Leclanche cell using potentiometer.
3. Determine the resistance of a moving coil galvanometer and calculate its Figure of Merit.
4. Determine voltage sensitivity of a moving coil galvanometer.
5. Study decay current in a RC circuit for any two values of capacitance and determine RC time constant.
6. Draw the characteristics of series resonance and determine resonant frequency, band width and Q – factor.
7. Draw the characteristics of parallel resonance and determine resonant frequency, band width and Q – factor.
8. Determine the Power Factor of an Inductive Circuit.
9. Determine the frequency of A. C. supply using a sonometer.
10. Study the varying current and varying voltage ranges by using various shunt resistances and a given micro-ammeter.
11. Determine ripple factor of a Half-Wave, Full-Wave and Bridge Rectifier using L and π type filter circuits.
12. Study the V-I characteristics of a given Junction Diode in forward and reverse bias.
13. Study Zener Diode voltage regulating characteristics.
14. Study the common base characteristics of a given PNP junction Transistor.
15. Study the common emitter characteristics of a given PNP junction Transistor.
16. Verify the Kirchoff's Current Law and Voltage Law

FACULTY OF SCIENCE

B.Sc. III Year (Practical) Examination

Subject: PHYSICS (New Syllabus)

Paper – IV
Modern Physics

QUESTION BANK
w.e.f. Annual 2011

Time: 3 Hours Max.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 to the candidate.

1. Determine e/m of an electron by using Thomson Method
2. Determine energy gap of a semiconductor using junction diode.
3. Study the temperature characteristics of a given Thermister and find the constants A and B.
4. Study the voltage gain and frequency response of a two stage R.C. coupled transistor amplifier.
5. Verify the truth tables for various Logic Gates (OR, AND, NOT, XOR, NAND Gates).
6. Verify De-Morgans theorems.
7. Verify Truth Tables for half and full adders.
8. Construct R C Phase shift oscillator. Study frequency of oscillation and the minimum gain required for sustained oscillations of the phase shift oscillator.
9. Draw hysteresis loop for a given transformer core and calculate its magnetic constants.
10. Determine the value of Planck's constant with the help of a photoelectric cell.
11. Study the characteristics of GM counter to determine its operating voltage, percent of plateau region, shelf ratio and counting statistics.
12. Study the absorption of β rays using G M counter.
13. Study the absorption of γ rays using G M counter.
14. Measure strength of magnetic field using Hall probe method.
15. Determine Magnetic Susceptibility of the solutions of different concentrations of a given salt using Quincke's method.
16. Study the alkaline earth spectra using a concave grating.

DEPARTMENT OF MATHEMATICS

B.A. / B.Sc.III (Practical) Examination 2010-2011

Subject: MATHEMATICS (New Syllabus)

Paper : III

QUESTION BANK

Time : 3 hours Marks : 50

UNIT-I (LINEAR ALGEBRA-I)

1) Let V be the set of all pairs (x,y) of real numbers and let F be the field of real numbers.

Define: $(x,y)+(x_1,y_1)=(x+x_1,0)$& $c(x,y)=(cx,0)$. Is V with these operations a vector space over the field of real numbers?

2) Is the set of all polynomials in x of degree ≤ 2 a vector space ? Justify.

3) Let R be the field of real numbers. Which of the following are subspaces of $V_3(R)$

(i)$\{(x,2y,3z): x,y,z \in R\}$

(ii) $\{(x,x,x): x \in R\}$

(iii))$\{(x,y,z): x,y,z \text{ are rational numbers}\}$

4) Which of the following sets of vectors $\alpha=(a_1,a_2,a_3,\ldots,a_n)$ in R^n are subspaces of R^n(n $\geq$ 3)?

(i) all α such that $a_1 \leq 0$

(ii) all α such that a_3 is an integer

(iii) all α such that $a_1+a_2+a_3+\ldots+a_n=k$ (k is a given constant).

5) Let V=R^3 and W be the set of all ordered triads (x,y,z) such that $x-3y+4z=0$

Prove that W is a subspace of R^3.

6) In the vector space R^4 determine whether or not the vector (3,9,-4,2) is a linear combination of the vectors (1,-2,0,3),(2,3,0,-1) and (2,-1,2,1).

7) Determine whether the vector (3,-1,0,-1) in the subspace of R^4 spanned by the vectors

(2,-1,3,2), (-1,1,1,-3) and (1,1,9,-5).

8) Find whether the following sets are linearly dependent or independent:

a) $\{(1,1,-1), (2,-3,5), (-2,1,4)\}$ of R^3

b) $\left\{\begin{bmatrix} 1 & -2 \\ -1 & 4 \end{bmatrix}, \begin{bmatrix} -1 & 1 \\ 2 & -4 \end{bmatrix}\right\}$ of $M_{2x2}(R)$

9) Determine whether the following vectors form basis of the given vector spaces

a) (2,1,0), (1,1,0), (4,2,0) of R^3

b) $x^2 + 3x - 2$, $2x^2 + 5x - 3$, $-x^2 - 4x + 4$ of $P_2(R)$

10) a) Show that the vectors (2,1,4), (1,-1,2), (3,1,-2) form the basis of R^3

b) Determine whether or not the vectors : (1,1,2), (1,2,5), (5,3,4) form a basis of R^3.

11) Let V=R^3 and W be the subspace of R^3 given by $w = \{(x, y, z): x - 3y + 4z = 0\}$. Prove that Wis a subspace of R^3 and find its dimension.

12) Let F be the field of complex numbers and let T be function from F^3 *into* F^3 defined by $T(x_1, x_2, x_3) = (x_1 - x_2 + 2x_3,\ 2x_1 + x_2 - x_3,\ -x_1 - 2x_2)$. Verify that T is linear transformation and describe the null space of T.

13) Show that the mapping $T: R^2 \longrightarrow R^3$ defined as T(a,b)=(a-b, b-a, -a) is a linear transformation from R^2 *into* R^3 .Find the Range ,Rank,Nullspace and Nullity of T.

14) Let F be a subfield of complex numbers and let T be the function from F^3 *into* F^3 defined by T(a,b,c)= (a-b+2c, 2a+b, -a-2b+2c) show that T is a linear transformation find also the Rank and Nullity of T.

15) Let $T: R^3 \longrightarrow R^3$ be the linear transformation defined by T(x,y,z)=(x+2y-z, y+z, x+y-2z) Find a basis and dimension of (i) the Range of T (ii) the Nullspace of T

16) Describe explicitly the linear transformation $T: R^2 \longrightarrow R^2$ such that T(2,3)=(4,5) and T(1,0)=(0,0).

17) Let T_1 and T_2 be two linear operators defined on V_3(R) by T_1 (a,b,c)=(a+b, 2b, 2b-a) T_2 (a,b,c)=(3a, a-b, 2a+b+c) for all (a,b,c) $\in V_3$(R) show that $T_1 T_2 \neq T_2 T_1$

18) Show that the operator T on R^3 defined by T(x,y,z)=(x+z, x-z, y) is invertible and find similar rule defining T^{-1}.

19) Let T be the linear operator on R^3 defined by

$T(x_1, x_2, x_3) = (3x_1 + x_3, -2x_1 + x_2, -x_1 + 2x_{2+}4x_3)$ What is the matrix of T in the ordered basis $\{\alpha_1, \alpha_2, \alpha_3\}$ where α_1=(1,0,1) α_2=(-1,2,1) and α_3=(2,1,1)?

20) Find the matrices of the linear transformation T on $V_3(R)$ defined as T(a,b,c)=(2b+c, a-4b, 3a) With respect to the standard ordered basis **B**={(1,0,0),(0,1,0),(0,0,1)}, and ordered basis $\boldsymbol{B'}$.={(1,1,1),(1,1,0),(1,0,0)}

UNIT-II(LINEAR ALGEBRA-II)

21) Find all (complex) proper values and proper vectors of the following matrices

a) $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 1 \\ 0 & i \end{bmatrix}$

22) Let T be the linear operator on R^3 which is represented in the standard ordered basis by the matrix $\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$. Prove that T is diagonalizable.

23) a) Determine whether the matrix A= $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$ similar over the field R to a diagonal matrix?

Is A similar over the field C to a diagonal matrix?

b) Prove that the matrix A= $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ is not diagonalizable over the field C.

24) Show that the characteristic equation of the complex matrix $A = \begin{bmatrix} 0 & 0 & c \\ 1 & 0 & b \\ 0 & 1 & a \end{bmatrix}$ is

$x^3 - ax^2 - bx - c = 0$.

25) Find all the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$

26) Find eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 5 & -6 & -6 \\ -1 & 4 & -2 \\ 3 & -6 & -4 \end{bmatrix}$

27) Show that the distinct eigenvectors of a matrix A corresponding to distinct eigen values of A are linearly independent.

28) If α, β are vectors in an inner product space $V(F)$ and a,b $\in$F , then prove that:

i)$\|a\alpha + b\beta\|^2 = |a|^2\|\alpha\|^2 + a\bar{b}(\alpha,\beta) + \bar{a}b(\beta,\alpha) + |b|^2\|\beta\|^2$

ii)$Re(\alpha,\beta) = \frac{1}{4}\|\alpha+\beta\|^2 - \frac{1}{4}\|\alpha-\beta\|^2$.

29) Prove that if α, β are vectors in an unitary space then

(i) $4(\alpha,\beta) = \|\alpha+\beta\|^2 - \|\alpha-\beta\|^2 + i\|\alpha+i\beta\|^2 - i\|\alpha-i\beta\|^2$.

(ii) $(\alpha,\beta) = Re(\alpha,\beta) + iRe(\alpha,i\beta)$

30) If in an inner product space $\|\alpha+\beta\| = \|\alpha\| + \|\beta\|$, then prove that the vectors α, β are linearly dependent. Give an example to show that the converse of this statement is false.

31) If $\alpha = (a_1, a_2\ a_3\ ,\ldots\ldots, a_n)$, $\beta = (\bar{b_1}\ b_2\ b_3\ ,\ldots\ldots\ldots\ b_n) \in V_n(R)$ then prove that :

$(\alpha,\beta) = a_1b_1 + a_2b_2 + a_3b_3 + \ldots\ldots + a_nb_n$. defines an inner product on $V_n(R)$.

32) If $\alpha = (a_1, a_2), \beta = (b_1, b_2) \in V_2(R)$. Define : $(\alpha,\beta) = a_1b_1 - a_2b_1 - a_1b_2 + 4a_2b_2$

Show that all the postulates of an inner product hold good.

33) Let V(C)be the vector space of all continuous complex-valued functions on the unit interval. $0 \le t \le 1$. If f(t),g(t) $\in$ V.let us define :$(f(t), g(t)) = \int_0^1 f(t)\overline{g(t)}\,dt$. Show that all the postulates of an inner product hold good.

34) Determine whether the following define an inner product in $V_2(R)$:

$(\alpha,\beta) = 2x_1y_1 + 5x_2y_2$ given by $\alpha = (x_1, x_2), \beta = (y_1, y_2)$

35) Apply Gram-Schmidt process to the vectors $\beta_1 = (1,0,1), \beta_2 = (1,0,-1)\ \beta_3 = (0,3,4)$ To obtain an orthonormal basis for $V_3(R)$ with the standard inner product.

36) Prove that the vectors $\alpha and\ \beta$ in a real inner product space are orthogonal if and only if $\|\alpha+\beta\|^2 = \|\alpha\|^2 + \|\beta\|^2$.

37) Prove that two vectors $\alpha and\ \beta$ in a complex inner product space are orthogonal if and only If $\|a\alpha + b\beta\|^2 = \|a\alpha\|^2 + \|b\beta\|^2$ for all pairs of scalars a and b.

38) a) Find a vector of unit length which is orthogonal to the vector α =(2,-1,6) of $V_3(R)$ with respect to the standard inner product.

b) Find two mutually orthogonal vectors each of which is orthogonal to the vector: α =(4,2,3) of $V_3(R)$ with respect to the standard inner product.

39) Let V be a finite-dimensional inner product space and let $\{\alpha_1, \alpha_2, \ldots\ldots\ldots \alpha_n\}$ be an orthonormal basis for V. Show that for any vectors α, β in V, $(\alpha, \beta) = \sum_{k=1}^{n} (\alpha, \alpha_k)\overline{(\beta, \alpha_k)}$.

40) Given the basis (2,0,1),(3,-1,5) and (0,4,2) for $V_3(R)$, construct from it by the Gram-Schmidt process an orthonormal basis relative to the standard inner product.

UNIT-III (MULTIPLE INTEGRALS)

41)Evaluate the following integral: $\iint xy(x^2 + y^2)dxdy$ over $[(0, a; 0, b)]$

42) Evaluate the following integral: $\iint \frac{x-y}{x+y} dxdy$ over $[0,1; 0,1]$.

43) Show that $\int_0^1 \{\int_0^1 \frac{x^2-y^2}{x^2+y^2} dy\}dx = \int_0^1 \{\int_0^1 \frac{x^2-y^2}{x^2+y^2} dx\}dy$.

44) Evaluate $\iint x^2y^2\, dxdy$ over the domain $\{(x,y): x \geq 0, y \geq 0, (x^2 + y^2) \leq 1\}$.

45) Evaluate the following integral: $\iint (x^2 + y^2)dxdy$ over the domain bounded by $xy = 1, y = 0, y = x, x = 2$.

46) Evaluate the following integral: $\iint \frac{x^2}{y^2} dxdy$ over the domain bounded by $xy = 1, y = x, x = 2$.

47) Show that $\int_0^1 \{\int_0^1 f(x,y)dx\}dy \neq \int_0^1 \{\int_0^1 f(x,y)dy\}dx$. Where $f(x,y) = \frac{y^2-x^2}{(y^2+x^2)^2}$

48)) Evaluate $\int_2^4 \int_{\frac{x}{x}}^{\frac{20-4x}{8-x}} (4 - y)dydx$ and also change the order of integration.

49) Evaluate $\iint_R (x^2 + y^2)dxdy$ over the domain bounded by $y = x^2$ and $y^2 = x$.

50) Prove that $\int_0^1 dx \int_x^{\frac{1}{x}} \frac{ydy}{(1+xy)^2(1+y^2)} = \frac{\pi-1}{4}$.

51) Evaluate $\iint (x + y + a)\, dxdy$ taken over $\{(x,y): (x^2 + y^2) \leq a^2\}$

52) Evaluate $\iint_R \sqrt{4x^2 - y^2}dxdy$ where the domain R is the triangle bounded by the lines

$y = 0, y = x, x = 1.$

53) Verify that $\iint_R (x^2 + y^2)dydx = \iint_R (x^2 + y^2)dxdy$ where the domain R is the triangle bounded by the lines $y = 0, y = x, x = 1.$

54) Evaluate $\iint_R f(x,y)dxdy$ where $f(x,y) = x^2 + y^2$ and $= \{(x,y): y = x^2, x = 2, y = 1\}.$

55) Evaluate $\iint_R xy(x + y)dxdy$ R is the region between $y = x^2, y = x.$

56) Prove that $\int_0^1 dx \int_0^1 \frac{(x-y)dy}{(x+y)^3} = \frac{1}{2}$ and $\int_0^1 dy \int_0^1 \frac{(x-y)dx}{(x+y)^3} = \frac{-1}{2}$.

57) Evaluate $\iint_R x(e^{x^2-y^2})dxdy$ where R is closed region bounded by the lines $y = x, y = x - 1,$ $y = 0, y = 1.$

58) Evaluate $\iint_R ydxdy$ over part of the plane bounded by the lines $y = x$ and the parabola $y = 4x - x^2.$

59) Change the order of integration and evaluate $\int_0^a \int_{\frac{x}{a}}^{\sqrt{ax}} (x^2 + y^2)dydx.$

60) Evaluate by changing order of integration $\int_0^a \int_0^{\sqrt{x^2-y^2}} (xy)dxdy.$

UNIT-IV (VECTOR CALCULUS)

61) a) If $A = 5t^2i + tj - t^3k$ and $B = sint\,i - cost\,j$ then find $\frac{a}{dt}(A \times B)$

b) If $A = x^2yzi - 2xz^3j + xz^2k$ and $B = 2zi + yj - x^2k$ Find $\frac{\partial^2}{\partial x \partial y}(A \times B)$ at (1,0,-2)

62) If $\vec{r} = xi + yj + zk$ and r = $|\vec{r}|$ then find : a) ∇r^n b) div(grad r)

63) If $A = 2yzi - x^2yj + xz^2k$ and $\varphi = 2x^2yz^3$ find: (i)$(A \times \nabla)\,\varphi$ (ii) $A \times \nabla\varphi.$ Are they equal?

64) a) For $\varphi = 2x^3y^2z^4$ find div(grad φ)

b) If $A = x^2yi - 2xzj + 2yzk$,Find curl(curl A)

65) a) Define Solenoidal vector . Show that $A = (2x^2 + 8xy^2z)i + (3x^3y - 3xy)j - (4y^2z^2 + 2x^3z)k$ is not a Solenoidal, but $B = xyz^2A$ is Solenoidal.

b) Define irrotational vectors. If V =(x+2y+az)i+(bx-3y-z)j+(4x+cy+2z)k

is irrotational then find a,b,c.

66) a) If $\vec{r} = xi + yj + zk$ and r =$|\vec{r}|$ then prove that $\frac{\vec{r}}{r^2}$ is irrotational

b) If A and B are irrotational , then prove that $(A \times B)$ Solenoidal

67) If $U = 3x^2y, V = xz^2 - 2y$ evaluate a) grad [grad U.grad V] b) curl [grad U × grad V].

68) Prove that : a)$\nabla^2 f(r) = \frac{d^2f}{dr^2} + \frac{2}{r}\frac{df}{dr}$.

b) Find $f(r)$ such that $\nabla^2 f(r) = 0$ where r =$|\vec{r}|$ & $\vec{r} = xi + yj + zk$.

69) The acceleration of a particle at any time t≥ 0 is given by :

a=$\frac{dv}{dt} = 12\cos 2ti - \sin 2tj + 16tk$. If the velocity V and displacement r are zero at t=0, find v and r at any time.

70) a) Find the total work done in moving a particle in a force field given by F= 3xyi-5zj+10xk along the curve x=$t^2 + 1$, y= $2t^2$, z= t^3 from t=1 to t=2.

b) Find the work done in moving a particle one moving around a circle C in the XY-plane , if the circle has center at origin and radius 3 and if the force field is given by :

$F = (2x - y + z)i + (x + y - z^2)j + (3x - 2y + 4z)k$.

71) Find $\int_c \vec{F}.d\vec{r}$ For $\vec{F} = (2xy + z^3)i + x^2j + 3xz^2k$ where C is the line joining (1,-2,1) to (3,1,4).

72) Evaluate $\iint_S A.n\,ds$, where A=18zi-12j+3yk and S is that part of the plane 2x+3y+6z=12 which is located in first octant.

73) If $\vec{F}$=$(2x^2 - 3z)i - 2xyj - 4xk$ evaluate : a) $\iiint_V$ ∇.Fdv and b) $\iiint_V \nabla \times \vec{F}dv$,where V is a closed bounded by the plane x=0=y=z and 2x+2y+z=4.

74) Evaluate $\iint A.n\,ds\ for\ A = yi + 2xj - zk$ and S is the surface of the plane 2x+y=6 in the first octant cut off by the plane z=4.

75) Verify Green's theorem in a plane for $\oint_C (xy + y^2)dx + x^2dy$ where c is the closed curve of the region bounded by :y=x and y=x^2.

76) Verify Gauss divergence theorem for $\vec{F} = 4xzi - y^2j$+yzk and S is the surface of the cube bounded by x=0,x=1;y=0,y=1;z=0,z=1.

77) Verify Green's theorem in a plane for $\oint_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where c is the boundary of the region defined by $y = \sqrt{x}$, y=x^2.

78) Verify Green's theorem in a plane for $\oint_c (x^2 - 2xy)dx + (x^2y + 3)dy$ around the boundary of the region defined by $y^2 = 8x$ and $x = 2$.

79) Verify Stoke's theorem $A = (2x - y)i - yz^2j - y^2zk$ where S is the upper half surface of the sphere $x^2 + y^2 + z^2 = 1$ and C is it's boundary.

80) Verify divergence theorem for $A = 2x^2yi - y^2j + 4xz^2k$ taken over the region in the first octant bounded by $y^2 + z^2 = 9$ and $x = 2$.

DEPARTMENT OF MATHEMATICS

B.A. / B.Sc.-III (Practical) Examination 2010-2011

Subject : MATHEMATICS (New Syllabus)

Paper : IV(a) Numerical Analysis

QUESTION BANK

Time : 3 hours **Marks : 50**

UNIT-I

1) Define the term percentage error. If $u = 3v^7 - 6v$ Find the percentage error in u at $v = 1$, if the error in v is 0.05.
2) Define the terms absolute and relative errors. If $y = \frac{0.31x+2.73}{x+0.35}$, where the coefficients are rounded off. Find the absolute and relative error in y when $x = 0.5 \pm 0.1$
3) If $u = \frac{5xy^2}{z^3}$ then find maximum relative error at $\Delta x = \Delta y = \Delta z = 0.001$ and $x = y = z = 1$
4) Find the real root of $x^3 - x - 1 = 0$, using Bisection method.
5) Find the real root of $x^3 - x^2 - 1 = 0$ up to three decimal places using Bisection method.
6) Use iterative method to find a real root of the following equation, correct to four decimal places $x = \frac{1}{(x+1)^2}$.
7) Use iterative method to find a real root of the following equation, correct to four decimal places $x = (5 - x)^{\frac{1}{3}}$.
8) Use iterative method to find a real root of the following equation, correct upto four decimal places $sinx = 10(x - 1)$.
9) Establish the formula $x_{i+1} = \frac{1}{2}(x_i + \frac{N}{x_i})$ and hence compute the value of $\sqrt{2}$ correct to six decimal places.

   Use newton Raphson method to obtain a root and correct to three decimal places of the following equations:

10) $sinx = 1 - x$ 11) $x^4 + x^2 - 80 = 0$ 12) $3x = cosx + 1$.

13) Find $\sqrt[3]{12}$ by Nweton's method.

14) Find a double root of $x^3 - 3x^2 + 4 = 0$ by Generalised Newton's method.

15) Using Ramanujan's method find a real root of the equation $xe^x = 1$.

16) Find the root of the equation $sinx = 1 - x$ by Ramanujan's method.

17) Find the smallest root of the equation $f(x) = x^3 - 6x^2 + 11x - 6 = 0$.

18) Using Ramanujan's method, find the real root of the equation

$$1 - x + \frac{x^2}{(2!)^2} - \frac{x^3}{(3!)^2} + \frac{x^4}{(4!)^2} - \cdots = 0.$$

19) Find the root of the equation $f(x) = x^3 - 2x - 5 = 0$ which lies between 2 & 3 by Muller's method.

20) Use Muller's method to find a root of the equation $x^3 - x - 1 = 0$.

UNIT-II

21) Using the difference operator prove the following (i) $\mu = \sqrt{1 + \frac{\delta^2}{4}}$

(ii) $1 + \mu^2\delta^2 = (1 + \frac{\delta^2}{2})^2$

22) Find u_6 if $u_0 = -3, u_1 = 6, u_2 = 8, u_3 = 12$ and 3rd differences are constant.

23) Find a cubic polynomial which takes the values

x	0	1	2	3	4	5
y	1	2	4	8	15	26

24) If $y_0 = 2649, y_2 = 2707, y_3 = 2967, y_4 = 2950, y_5 = 2696$ and $y_6 = 2834$ then find y_1.

25) Prove the following

a) $u_x = u_{x-1} + \Delta u_{x-2} + \Delta^2 u_{x-3} + \cdots + \Delta^{n-1} u_{x-n} + \Delta^n u_{x-n}$

b) $u_x + x_{c_1}\Delta^2 u_{x-1} + x_{c_2}\Delta^4 u_{x-2} + \cdots = u_0 + x_{c_1}\Delta u_1 + x_{c_2}\Delta^2 u_2 + \cdots$

26) From the following table ,find the number of students who secured mark between 60 and 70.

Marks obtained	0-40	40-60	60-80	80-100	100-120
Number of students	250	120	100	70	50

27) Find the cubic polynomial which takes the values :

$y(1) = 24,\ y(3) = 120,\ y(5) = 336,\ y(7) = 720.$ Hence obtain $y(8)$.

28) The following data gives the melting point of an alloy of lead and zinc; θ is the temperature in degree centigrade; x is the percent of lead. Find θ when $x = 84$.

x	40	50	60	70	80	90
θ	184	204	226	250	276	304

29) From the following table, find the value of $e^{1.17}$ by using Gauss forward formula.

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
e^x	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

30) The following values of x and y are given .Find the value of $y(0.543)$.

x	0.1	0.2	0.3	0.4	0.5	0.6	0.7
$y(x)$	2.631	3.328	4.097	4.944	5.875	6.896	8.013

31) Use Gauss interpolation formula to find y_{41} with help of following data

$y_{30} = 3678.2,\ y_{35} = 2995.1,\ y_{40} = 2400.1,\ y_{45} = 1876.2,\ y_{50} = 1416.2$

32) By using central difference formula find the value of log 337.5 satisfying the following table

x	310	320	330	340	350	360
$logx$	2.4014	2.5052	2.5185	2.5315	2.5441	2.5563

33) Values of $y = \sqrt{x}$ are listed in the following table, which are rounded off to 5 decimal places. Find $\sqrt{1.12}$ by using Stirling's formula

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
$y = \sqrt{x}$	1.00000	1.02470	1.04881	1.07238	1.09544	1.11803	1.14017

34) By using Lagrange's formula, express the following rational fraction as sum of partial fractions $\frac{x^2+6x+1}{(x^2-1)(x^2-10x+24)}$.

35) By means of Lagrange's formula prove that approximately

$$y_0 = \frac{1}{2}(y_1 + y_{-1}) - \frac{1}{8}\left[\frac{1}{2}(y_3 - y_1) - \frac{1}{2}(y_{-1} - y_{-3})\right]$$

36) Apply Lagrange's formula to find the root of $f(x) = 0$ when $f(30) = -30,\ f(34) = -13,\ f(38) = 3, f(42) = 18.$

37) Use Stirling's formula to find u_{32} for the following table

$u_{20} = 14.035,\ u_{25} = 13.674,\ u_{30} = 13.257,\ u_{35} = 12.734,\ u_{40} = 12.089,$
$u_{45} = 11.309.$

38) Construct the divided difference table for the given data and evaluate $f(1)$.

x	-4	-2	-1	0	2	5	10
$f(x)$	469	47	7	1	-5	271	7091

39) Use Newton's divided difference interpolation to obtain a polynomial $f(x)$ satisfying the following data of values and hence find $f(5.)$

x	-1	0	3	6	7
$f(x)$	3	-6	39	822	1611

40) Prove that the third order divided difference of the function $f(x) = \frac{1}{x}$ with arguments a, b, c, d is $-\frac{1}{abcd}$.

UNIT-III

41) Fit a straight line of the form $y = a + bx$ to the data

x	0	5	10	15	20	25	30
y	10	14	19	25	31	36	39

42) Find best values of a, b, c so that the parabola $y = a + bx + cx^2$ fits the data

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.2	1.5	2.6	2.8	3.3	4.1

43) Fit a second degree parabola of the $y = ax^2 + bx + c$ to the following data.

x	0	1	2	3	4
y	1	5	10	22	38

44) Determine the constants a and b by the method of least squares such that $y = ae^{bx}$ fits the following data:

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

45) Fit a function of the form $y = ax^b$ to the following data:

x	2	4	7	10	20	40	60	80
y	43	25	18	13	8	5	3	2

46) Find the values of a_0 and a_1 so that $y = a_0 + a_1 x$ fits the data given in the table

x	0	1	2	3	4
y	1.0	2.9	4.8	6.7	8.6

47) Find $\frac{d}{dx}(J_0)$ at $x = 0.1$ from the data given in the table:

x	0.0	0.1	0.2	0.3	0.4
$J_0(x)$	1.0000	0.9975	0.9900	0.9776	0.9604

48) Find the first and second derivatives of $f(x)$ at the point $x = 3.0$ from the following table:

x	3.0	3.2	3.4	3.6	3.8	4.0
$f(x)$	-14.000	-10.032	-5.296	0.256	6.672	14.000

49) From the following table of values of x and y obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for $x = 2.2$

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3210	4.0552	4.9530	6.0496	7.3891	9.0250

50) The following table of values of x and y is given :

x	0	1	2	3	4	5	6
y	6.9897	7.4036	7.7815	8.1291	8.4510	8.7506	9.0309

Find $\frac{dy}{dx}$ at $x = 3$.

51) From the following values of x and y, find $\frac{dy}{dx}$ when $x = 6$.

x	4.5	5.0	5.5	6.0	6.5	7.0	7.5
y	9.69	12.90	16.71	21.18	26.37	32.34	39.15

52) Find the minimum and maximum values of the functions from the following table

x	0	1	2	3	4	5
$f(x)$	0	0.25	0	2.25	16.00	56.25

53) Evaluate by using Trapezoidal rule

a) $\int_0^{\pi} tsint\, dt$ (with 6 strips)

b) $\int_{-2}^{2} \frac{t}{5+2t} dt$ (with 8 strips)

54) When a train is moving at 30 miles an hour, steam is burnt off and breaks are applied. The speed of the train in miles per hour after t seconds is given by :

t	0	5	10	15	20	25	30	35	40
v	30	24	19.5	16	13.6	11.7	10.8	8.5	7.0

Determine how far the train has moved in 40 seconds.

55) Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{sin\theta}\ d\theta$, using Simpson's rule with h=$\frac{\pi}{12}$.

56) Use the Simpson's $\frac{3^{th}}{8}$ rule to obtain an approximation of $\int_0^{0.3} (1 - 8x^3)^{\frac{1}{2}} dx$ with h=0.05.

57) Evaluate $\int_0^1 cosxdx$ using h=0.2.

58) Find the value of $\int_3^7 x^2\, logx\, dx$ by taking 8 strips using Boole's rule.

59) Use Weedle's rule to obtain an approximate value of π from the formula $\int_0^1 \frac{1}{1+x^2} dx = \frac{\pi}{4}$.

60) Apply Trapezoidal and Simpson's rules to the integral $I = \int_0^1 \sqrt{1 - x^2} dx$ by dividing the range into 10 equal parts.

UNIT-IV

61) Use Matrix inversion method to solve the system of equation:
$3x + 2y + 4z = 7,\ 2x + y + z = 7,\ x + 3y + 5z = 2.$

62) Use Matrix inversion method to solve the system of equation:
$x + 2y + 3z = 10,\ 2x - 3y + z = 1,\ 3x + y - 2z = 9.$

63) Solve the following system of equations using Gauss elimination method:
$x_1 - 2x_2 - x_4 = 2,\ 2x_1 + 2x_2 + x_3 + 2x_4 = 7$
$3x_1 - x_2 - 2x_3 - x_4 = 3,\ x_1 - 2x_4 = 0.$

64) Solve the following system of equations using Gauss elimination method:
$2x_1 + x_2 + 4x_3 = 12,\ 8x_1 - 3x_2 + 2x_3 = 20,$
$4x_1 + 11x_2 - x_3 = 33$

65) Solve the following system of equations using Factorization method:
$5x - 2y + z = 4,\ 7x + y - 5z = 8,\ 3x + 7y + 4z = 10.$

66) Solve the following system of equations using Factorization method:
$2x - 3y + 10z = 3, -x + 4y + 2z = 20, 5x + 2y + z = -12.$

67) Solve the following system of equations using Jacobi's iterative method:
$10x + 2y + z = 9,\ 2x + 20y - 2z = -44,\ -2x + 3y + 10z = 22.$

68) Apply Gauss-siedal iterative method to solve:
$10x + y + z = 12,\ 2x + 10y + z = 13,\ 2x + 2y + 10z = 14.$

69) Apply Gauss-siedal iterative method to solve:-
$27x + 6y - z = 85,\ 6x + 15y + 2z = 72,\ x + y + 54z = 110.$

70) Solve the following system of equations using Jacobi's itterative method:
$17x_1 + 65x_2 - 13x_3 + 50x_4 = 84,\ 12x_1 + 16x_2 + 37x_3 + 18x_4 = 25$
$56x_1 + 23x_2 + 11x_3 - 19x_4 = 36,\ 3x_1 - 5x_2 + 47x_3 + 10x_4 = 18.$

71) Using Taylor's series method to find the value of $y(0.1)$ and $y(0.2)$ if $y(x)$ satisfies $\frac{dy}{dx} = x - y^2$ with $y(0) = 1$.

72) Solve $\frac{dy}{dx} = x + y$ by Taylor's series method starting with $x_0 = 1, y_0 = 0$ and carry to $x = 1.2$ with $h = 0.1$. Compare the final result with the value of explicit solution.

73) Using Picard's method solve $\frac{dy}{dx} = 1 + xy$ with $y(0) = 1$. Find $y(0.1), y(0.2) \ldots y(0.5)$.

74) Use Picard's method to approximate y upto 3 decimal places when $x = 0.2$.Given that $y(0) = 1$ and $\frac{dy}{dx} = x - y$.

75) Using Euler's method, solve the following initial value problems:

i) $\frac{dy}{dx} + 2y = 0, \quad y(0) = 1$

ii) $\frac{dy}{dx} - 1 = y^2, \; y(0) = 0$ in each case take $h = 0.1$ and obtain $y(0.1), \; y(0.2), \; y(0.3)$.

76) Given $\frac{dy}{dx} = x^2 + y, \; y(0) = 1$ determine $y(0.02), \; y(0.04), \; y(0.06)$ using modified Euler's method

77) Find y when $x = 0.1, \; x = 0.2, \; x = 0.3$ from the following initial value problem by Runge-Kutta's 4th order method $y' = x - y^2, \quad y(0) = 1$

78) Given $\frac{dy}{dx} = 1 + y^2$, where $y = 0$ when $x = 0$, find$y(0.2), \; y(0.4), \; y(0.6)$ by Runge-Kutta's 4th order method.

79) Apply Milne's method to the equation $y' = x + y^2$ with $y(0) = 0$ to find $y(0.8)$. (take $h = 0.2$ to obtain initial values)

80) Using Milen's method solve the differential equation $(1 + x)\frac{dy}{dx} + y = 0$ with $y(0) = 2$. Find $y(1.5)$. (take $h = 0.5$ to obtain initial values)

DEPARTMENT OF MATHEMATICS

B.A. / B.Sc.-III (Practical) Examination 2010-2011

Subject : MATHEMATICS (New Syllabus)

Paper : IV(b)

QUESTION BANK

Time : 3 hours **Marks : 50**

UNIT-I (FOURIER SERIES)

1) Prove that the fourier series of $f(x) = x + x^2$ for $-1 < x < 1$, is

$$f(x) = \frac{1}{3} + \frac{2}{\pi}\sum_1^\infty (-1)^n \left(\frac{2cosn\pi x}{n^2\pi} - \frac{sinn\pi x}{n}\right)$$

2) If $f(x)$=1 when $0 < x < 1$, $f(x)$=2 when $1 < x < 3, f(x)=\frac{3}{4}$ when $x = 0, 1$ & 3

& f$(x + 3)$=f(x) $\forall x$. Show that f $(x) = \frac{5}{9} - \frac{1}{\pi}\sum_1^\infty \frac{2sin\frac{n\pi}{3}}{n} cosn\pi(2x - 1)$ $\forall x$.

3) Expand in a series of sine and cosines of multiples of x, for function given by $f(x) = \pi + x$,

When $-\pi < x < 0$; $f(x) = \pi - x$ when $0 < x < \pi$; What is the sum of the series for

$x = \pm\pi$ and $x = 0$?

4) Find a) fourier sine series and b) fourier cosine series which represents $f(x) = \pi - x$ in $0 < x < \pi$.

5) Show that the fourier series which converges to $f(x)$ in $-\pi \leq x \leq \pi$ where $f(x) = x + x^2$ when

$-\pi < x < \pi$ and $f(x) = \pi^2$ when $x = \pm\pi$ is $\frac{\pi^2}{3} + 4\sum_1^\infty (-1)^n \left(\frac{cosnx}{n^2} - \frac{sinnx}{2n}\right)$.Deduce

that $\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$.

6) Obtain fourier series whose sum is equal to $f(x)$ where $f(x) = 0$ when $-\pi \leq x < -\frac{\pi}{2}$,

$f\left(-\frac{\pi}{2}\right) = -\frac{\pi}{4}$; $f(x) = x$ when $-\frac{\pi}{2} < x < \frac{\pi}{2}$; $f\left(\frac{\pi}{2}\right) = \frac{\pi}{3}$; $f(x) = 0$

when $\frac{\pi}{2} < x \leq \pi$.

7) If $f(x) = cosx$ for $0 < x < \pi$ and $f(x) = -cosx$ for $-\pi < x < 0$; show that fourier series which converges to $f(x)$ is $\frac{\pi}{4}(\frac{2}{1.3}sin2x + \frac{4}{3.5}sin4x + \frac{6}{5.7}sin6x + ...)$

8) Find the fourier series which represents $|sinx|$ in $-\pi \leq x \leq \pi$.

9) Show that fourier series for the function e^x in the interval $-\pi \leq x \leq \pi$ is

$$\frac{e^{\pi}-e^{-\pi}}{\pi}\left(\frac{1}{2} + \sum_1^{\infty}\frac{(-1)^n}{n^2+1}\ (cosnx - nsinnx)\ \right)$$

10) Show that the fourier series in interval $-\pi \leq x \leq \pi$ for the function

$$coskx = \frac{sink\pi}{\pi}\left(\frac{1}{k} - \frac{2kcosx}{k^2-1^2} + \frac{2kcos2x}{k^2-2^2}\right)$$, k being non integer.

11) Show that the half range fourier cosine series for f(x) in $[0,\pi]$ is $f(x) = \frac{\pi^2}{16} - 2\sum_1^{\infty}\frac{\cos(4n-2)x}{(4n-2)^2}$,

where $f(x) = \frac{\pi x}{4}$ $0 \leq x \leq \frac{\pi}{2}$ and $\frac{\pi}{4}(\pi - x)$ when $\frac{\pi}{2} < x \leq \pi$.

12) Show that the half range fourier cosine series for f(x) in $0 \leq x \leq 1$ *is*

$$f(x) = \frac{1}{x^2}\{\sum_1^{\infty}\frac{cos2n\pi x}{n^2}\} \text{ where } f(x) = x^2 - x + \frac{1}{6}$$

13) Show that the half range fourier sine series for f(x) in $0 \leq x \leq 1$ *is*

$$f(x) = \frac{-1}{\pi}\left\{\sum_1^{\infty}\frac{sin2n\pi x}{n}\right\} \text{ where } f(x) = x - \frac{1}{2}.$$

14) Find the fourier series on the interval $-\pi \leq x < \pi$ for

$f(x) = -\frac{\pi}{2}$, when $-\pi < x < 0$ $f(x) = \frac{\pi}{2}$, when $0 < x < \pi$

15) If $f(x) = \frac{a}{4} - x$ when $0 \leq x \leq \frac{a}{2}$ and $f(x) = \frac{-3a}{4} + x$ when $\frac{a}{2} \leq x \leq a$, Show that the fourier cosine series of f(x) $\forall\ x$ in $0 \leq x \leq a$, $f(x) = \frac{2a}{\pi^2}\sum_1^{\infty}\frac{1}{(2n-1)^2}\frac{\cos(4n-2)\pi x}{a}$.

16) Find the fourier series for the function $f(x)$, where $f(x) = x + \frac{x^2}{4}$ in the interval $-\pi < x < \pi$.

17) Show that the half range fourier sine series for the function $f(x)$, where $f(x) = x(\pi - x)$ in $(0,\pi)$ is $\frac{8}{\pi}\sum_1^{\infty}\frac{\sin(2n-1)x}{(2n-1)^3}$.

18) Find the fourier series expansion of $f(x) = \frac{n-x}{2}$ in $0 < x < 2\pi$.

19) Find the fourier series expansion of $f(x) = e^{-x}$ in $(0,2\pi)$.

20) Show that the fourier series for the function f(x) defined by $f(x) = 0$ when $-3 < x < 0$;

$f(x) = 1$ when $0 < x < 3$ and $f(0) = \frac{1}{2}$ is $\frac{1}{2} + \frac{2}{\pi}\sum_1^{\infty} \frac{\sin(2n-1)\pi x}{3(2n-1)}$ in $-3 < x < 3$.

UNIT-II (LAPLACE AND INVERSE LAPLACE TRANSFORMATION)

21) Show that $L\{(5e^{2t} - 3)^2\} = \frac{25}{p-4} - \frac{30}{p-2} + \frac{9}{p}; p > 4.$

22) Show that $L\{t^2 \cos at\} = \frac{2p(p^2-3a^2)}{(p^2+a^2)^2}; p > 0.$

23) Prove that $\int_0^{\infty} t^3 e^{-t} \sin t dt = 0.$

24) Find $L\{F(t)\}$ and $L\{F'(t)\}$, for the function given by $F(t) = 2t$ *when* $0 \le t \le 1$ and $F(t)=t$ when $t>1$.

25) Show that $L\{\frac{\cos at - \cos bt}{t}\} = \frac{1}{2}\log(\frac{p^2+b^2}{p^2+a^2})$

26) If $F(t)=\begin{cases} 3t, & 0 < t < 2 \\ 6, & 2 < t < 4 \end{cases}$ find $L\{F(t)\}$, where F(t) has period 4.

27) Compute $L\{F(t)\}$,if $F(t)=\begin{cases} \sin t, & 0 < t < \pi, \\ 0, & \pi < t < 2\pi \end{cases}$ where F(t) has period 2π.

28) Find $L\{\sin\sqrt{t}\}$.

29) Find $L\{\text{erf}\sqrt{t}\}$.

30) Show that $L\{\frac{\cos\sqrt{t}}{\sqrt{t}}\} = \sqrt{\frac{\pi}{p}} e^{\frac{-1}{4p}}$.

31) Evaluate i) $L^{-1}\{\frac{1}{(P^3+1)}\}$; ii) $L^{-1}\{\frac{6}{(2P-3)} - \frac{3+4p}{3p^2-16} + \frac{8-6p}{16p^2+9}\}$.

32) Evaluate i) $L^{-1}\{\frac{P-1}{(P+3)(P^2+2P+2)}\}$; ii) $L^{-1}\{\frac{3P+7}{(P^2-2P-3)}\}$.

33) State second shifting property and hence evaluate $L^{-1}\{\frac{(P+1)e^{-\pi p}}{(P^2+P+1)}\}$.

34) Evaluate (i) $L^{-1}\{\frac{p}{(p^2+a^2)^2}\}$; ii) $L^{-1}\{\frac{p}{(p^2-16)^2}\}$.

35) Evaluate (i) $L^{-1}\left\{\frac{1}{p}\log\left(1 + \frac{1}{p^2}\right)\right\}$; ii) $L^{-1}\left\{\frac{1}{p^3(p^2+1)}\right\}$.

36) Evaluate (i) $L^{-1}\left\{\frac{1}{(p^2+4)(p+1)^2}\right\}$; ii) $L^{-1}\left\{\frac{6p^2+22p+18}{p^3+6p^2+11p+6}\right\}$.

37) Evaluate (i) $L^{-1}\left\{\frac{3p^3-3p^2-40p+36}{(p^2-4)^2}\right\}$; ii) $L^{-1}\left\{\frac{5p^2-15p-11}{(p+1)(p-2)^2}\right\}$.

38) State Heavisides expansion formula. Using it find $L^{-1}\left\{\frac{p+5}{(p+1)(p^2+1)}\right\}$.

39) Define convolution of two functions and using convolution theorem evaluate $L^{-1}\left\{\frac{1}{(p-2)(p+2)^2}\right\}$.

40) Define Beta function using convolution theorem prove that B(m,n)= $\frac{(gamma\ of\ m)(gamma\ of\ n)}{(gamma\ of m+n)}$ $m > 0, n > 0$.

UNIT-III(FOURIER TRANSFORMATION)

41) Find fourier cosine transform of $f(x) = \frac{1}{1+x^2}$ and hence find fourier sine transformation of $\frac{x}{1+x^2}$.

42) Find fourier sine transform of $f(x) = \frac{e^{-ax}}{x}$.

43) Find fourier cosine transform of $f(x) = e^{-x^2}$.

44) Find inverse fourier transform of $\tilde{f}(p) = e^{-|p|y}$

45) Find f(x) if $\tilde{f}_s(p) = p^n e^{-ap}$.

46) Find f(x) if $\tilde{f}_c(p) = \begin{cases} \frac{1}{\sqrt{2\pi}}\left(a - \frac{p}{2}\right) & if\ ,\ p < 2a. \\ 0 \quad if & p \geq 2a. \end{cases}$

47) Use sine inversion formula to obtain f(x) if $\tilde{f}_s(p) = \frac{p}{p^2+1}$.

48) If $f(x) = \begin{cases} x & ;\ 0 < x < 1 \\ 2-x & ;\ 1 < x < 2 \\ 0 & ;\ x > 2 \end{cases}$ find fourier cosine and sine transform of $f(x)$.

49) Find fourier cosine transform of $f(x) = x^{m-1}$.

50) Find fourier transform of $f(x)$ if $f(x) = x^2, when\ |x| < a\ and\ f(x) = 0\ when\ |x| > a$

51) Find fourier transform of $f(x)$ if $f(x) = x, when\ |x| \le a\ and\ f(x) = 0\ when\ |x| > a$.

52) Find the complex fourier transform of $e^{-|x|}$.

53) Find the finite fourier sine transform and cosine transform of $f(x) = x$.

54) Find the finite fourier cosine transform of $f(x)$ if $f(x) = -\frac{cosk(\pi - x)}{ksink\pi}$ in $(0, \pi)$ and find $f(x)$ if $\widetilde{f_c}(p) = \frac{\cos(2p\frac{\pi}{3})}{(2p+1)^2}$ in 0<x<1.

55) Find the finite fourier sine transform and cosine transform of $f(x) = x^2; 0 < x < \pi$.

56) Find the finite fourier sine transform $f(x)$ if $f(x) = x; 0 \le x \le \frac{\pi}{2}$ and $f(x) = \pi - x; \frac{\pi}{2} \le x < \pi$.

57) Find the finite fourier sine transform of $f(x)$ if $f(x) = sinnx$.

58) Find the finite fourier sine transform of $x(\pi^2 - x^2)$ and $x(\pi - x)$.

59) If $f(x) = \begin{cases} 1, & |x| < 1 \\ 0, & |x| > 1 \end{cases}$ then find fourier transform of f(x) and usig parseval's identity prove that $\int_0^\infty (\frac{sint}{t})^2\, dt = \frac{\pi}{2}$.

60) If $f(x) = \begin{cases} 1 - x^2, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$ then find fourier transform of f(x) and usig parseval's identity prove that $\int_0^\infty (\frac{sinx - xcosx}{x^3})^2\, dx = \frac{\pi}{15}$.

UNIT-IV(APPLICATIONS OF LAPLACE TRANSFORMATION TO ORDINARY DIFFERIENTIAL EQUATION AND FOURIER TRANSFORMATION TO INITIAL AND BOUNDARY VALUE PROBLEMS)

61) Solve $(D^2 + 2D + 1)y = 3te^{-t},\ t > 0$, subject to conditions $y = 4,\ Dy = 2$ when $t = 0$.

62) Solve $(D^2 - 3D + 2)y = 1 - e^{2t}$, subject to conditions $y = 1,\ Dy = 0$ when $t = 0$.

63) Solve $(D^3 + 1)y = 1,\ t > 0$, subject to conditions $y = Dy = D^2y = 0$, when $t = 0$.

64) Solve $(D^2 + 9)y = 18t$, if $y(0) = 0;\ y\left(\frac{\pi}{2}\right) = 0$.

65) Solve $(D^2 + 2D)y = 0$, if $y(0) = 0;\ y(-1) = 1$.

66) Solve $(D^2 + 5D + 6)y = 5e^t$, subject to conditions $y = 2,\ Dy = 1$ when $t = 0$.

67) Solve $(D^3 - 3D^2 + 3D - 1)y = t^2e^t$;, subject to conditions $y = 1,\ Dy = 0,\ D^2y = -2$ when

$t = 0$.

68) Solve $ty'' + y' + 4ty = 0$; $y(0) = 3, y'(0) = 0$.

69) Solve $y'' - ty' + y = 1$; $y(0) = 1, y'(0) = 2$.

70) Solve $y'' + ty' - y = 0$; $y(0) = 0, y'(0) = 1$.

71) Solve $(D^2 - 1)x + 5Dy = t$; $-2Dx + (D^2 - 4)y = -2$; *if* $x = 0 = Dx = y = Dy$ when $t = 0$.

72) Solve $(D - 2)x - (D + 1)y = 6e^{3t}$; $(2D - 3)x + (D - 3)y = 6e^{3t}$ *if* $x = 3; y = 0$ when $t = 0$.

73) Solve $(D^2 + 2)x - Dy = 1; Dx + (D^2 + 2)y = 0$ *if* $x = Dx = y = Dy = 0$ when $t = 0$.

74) Solve $\frac{\partial y}{\partial t} = \frac{\partial^2 y}{\partial x^2}$ where $y\left(\frac{\pi}{2}, t\right) = 0$; $\left(\frac{\partial y}{\partial x}\right)_x = 0$ and $y(x, 0) = cos5x$.

75) Solve $\frac{\partial y}{\partial t} = 3\frac{\partial^2 y}{\partial x^2}$ where $y_x(0, t) = 0, y\left(\frac{\pi}{2}, t\right) = 0$; and $y(x, 0) = 20cos3x - 5cos9x$.

76) Solve $\frac{\partial y}{\partial t} = 2\frac{\partial^2 y}{\partial x^2}$ where $y(0, t) = 0 = y(5, t)$ and $y(x, 0) = 10sin4\pi x$.

77) Solve $\frac{\partial^2 y}{\partial x^2} - \frac{\partial^2 y}{\partial t^2} = xt$ where $y = 0 = \frac{\partial y}{\partial t}$ at $t = 0$.

78) Solve: $\frac{\partial U}{\partial t} = \frac{\partial^2 U}{\partial x^2}$ if $u_x(0, t) = 0, u(x, 0) = \begin{cases} x & 0 \le x \le 1 \\ 0 & x > 1 \end{cases}$
and $u(x, t)$ is bounded where $x > 0, t > 0$

79) Solve $\frac{\partial U}{\partial t} = 2\frac{\partial^2 U}{\partial x^2}$ if $U(0, t) = 0; U(x, 0) = e^{-x}$; $x > 0, U(x, t)$ is bounded where
$x > 0, t > 0$.

80) Solve: $\frac{\partial U}{\partial t} = \frac{\partial^2 U}{\partial x^2}$, $x > 0, t > 0$ subject to the conditions

i) $u = 0$ when $x = 0, t > 0$.

ii) when $t = 0$; $u = \begin{cases} 1 & 0 < x < 1 \\ 0 & x \ge 1 \end{cases}$

iii) $u(x, t)$ is bounded.

FACULTY OF ARTS & SCIENCE

B.A. / B.Sc.-III (Practical) Examination 2010-2011

Subject: MATHEMATICS (New Syllabus)

Paper: IV (d) DISCRETE MATHEMATICS

QUESTION BANK

Time: 3 Hours **MARKS: 50**

UNIT-I

1) Let A be a set. Define P(A) as the all subsets of A. List P(A) ,where A= {1,2,3}.If P(A) has 256 elements ,how many elements are in A?.

2) If A= {0, 1} and B= {1, a} determine the sets i) A X {1} X B, ii) (B x A), (A x B)

3) Prove that $B - A^{1} = B \cap A$

4) Let R be the relation from A= {1, 2, 3, 4, 5} to B= {1, 3, 5} which is defined by "x is less than y". Write R as a set of ordered pairs

5) Shat the following pairs of integers are congruent modulo 7. a) 3 and 24 b) -31 and 11. c) -15 and -64.

6) Prove that if R is antisymmetric relation so is R^{-1}

7) construct the truth table for $[(pvq)\Lambda(\sim r)] \leftrightarrow q$

8) State the converse, contra positive and opposite to the following:

a) If the triangle is equiangular, then it is equilateral
b) If triangle ABC is aright triangle, then $|AB|^2 + |BC|^2 = |AC|^2$

9) Construct the truth table for $\sim (pvq)\ v[(\sim p)\ \Lambda q]vp$

10) Verify that the following argument is valid by translating into symbols and using truth tables to check for tautologies:

If Joe is a mathematician then he is ambitious.
If Joe is an early raiser, then he does not like oatmeal.
If Joe is ambitious, then he is an early raiser.
Hence, if Joe is a mathematician, then he does not like oatmeal.

11) Verify that the following argument is valid by using the rule of inference.

If Clifton does not live in France, then he does not speak French.
Clifton does not drive a Datsun.
If Clifton lives in France, then he rides a bicycle
Either Clifton speaks French, or he drives a Datsun.
Hence Clifton rides a bicycle

12) Prove or disprove the validity of the following argument:

Every living thing is a plant or an animal.
David's dog is alive and it is not a plant.
All animals have hearts
Hence, David's dog has a heart.

13) Prove or disprove the validity of the following argument:

All integers are rational numbers.
Some integers are powers of 2.

14) The following propositions involve predicates that define sets. Use the properties to conclude relationship between the sets. Use Venn diagrams check e validity of the argument:

Some scientists are not engineers.
Some astronauts are not engineers.
Hence, some scientists are not astronauts
Therefore some rational numbers are powers of 2.

15) Use the mathematical induction to prove $1.2+2.3+3.4+\ldots\ldots\ldots+n\,(n+1) = n\,(n+1)\,(n+2)/3$

16) Use the mathematical induction to prove x^n-y^n is a factor of the polynomial x-y.

17) Use the mathematical induction to prove $3n^5+5\,n^3+7n$ is divisible by 15 for each positive integer n.

18) Use the mathematical induction to prove for each integer $n \geq 10$, $2^n > n^3$

19) Show that the sum of the first n terms of an arithmetic progression with initial term a and common difference d is $n/2[2a+ (n-1)\,d]$.

20) Use the mathematical induction to prove $11^{n+2}+12^{2n+1}$ is divisible by 133.

UNIT-I I

21) Build a generating function for a_r = the number of integral solutions to the equation $e_1+ e_2+ e_3=r$ if $0 \leq e_i \leq 3$ for each i.

22) Write a generating function for a_r when a_r is

a) The number of integers between 0 and 999 whose sum of digits r
b) The number of ways of selecting r balls from 3 red balls,5 blue balls,7 white balls

23) Find the coefficient of i) X^{23} ii) X^{32} in $(1+ X^5+ X^9)^{10}$

24) Find the coefficient of X^{16} in $(1+ X^4+ X^8)^{10}$

25) Write the formal power series expression for the following:

(a) $1 \div (1-5X)$ (b) $1 \div (3+X)$ (c) $1 \div (1-X)^5$

26) Use partial fractions to compute (a) $1/ (1-7x+12x^2)$ (b) $1/(x-2)(x+1)^2$

27) How many ways are there to paint 20 identical rooms in a hotel with 5 colors if there is only enough blue, pink and green paint to paint 3 rooms

28) Solve $a_n = a_{n-1} +n.$ Where $a_0=2.$

29) Solve $a_n = a_{n-1}+3n^2+3n+1.$ Where $a_0=1.$

30) Solve the recurrence relation using generating function.
$a_n -5a_{n-1}+6a_{n-2}=0$ for $n\geq2$ and $a_0=1$, $a_1 =-2$

31) Solve the recurrence relation using generating function.
$a_n -a_{n-1}-9a_{n-2}+9a_{n-3}=0$ for $n\geq3$and $a_0=0$, $a_1 =1$ and $a_2=2$

32) Find the general expression for a_n using generating function.
$a_n -7a_{n-1}+12a_{n-2}=0$ for $n\geq2$

33) Solve the recurrence relation using generating function.
$a_n -3a_{n-1}-4a_{n-2}=0$ for $n\geq2$and $a_0=1$, $a_1 =1$.

34) Solve the recurrence relation using characteristic roots.
$a_n -3a_{n-1}-4a_{n-2}=0$ for $n\geq2$and $a_0=1$, $a_1 =1$.

35) Solve the recurrence relation using characteristic roots.
$a_n +a_{n-1}-5a_{n-2}+3a_{n-3}=0$ for $n\geq3$and $a_0=0$, $a_1 =1$ and $a_2=2$

36) Solve the recurrence relation using characteristic roots.
$a_n - a_{n-1} - 6a_{n-2} = 0$ for $n \geq 2$ and $a_0 = 12$, $a_1 = -1$.

37) Solve the recurrence relation using generating function.
$a_n - 3a_{n-1} - 4a_{n-2} = 0$ for $n \geq 2$ and $a_0 = 1$, $a_1 = 1$.

38) Solve the inhomogeneous recurrence relation using generating function.
$a_n - 5a_{n-1} + 6a_{n-2} = 4^{n-2}$ for $n \geq 2$ and $a_0 = 1$, $a_1 = 5$

39) Find the complete solution of to $a_n - 10a_{n-1} + 25a_{n-2} = 2^n$ and $a_0 = 2/3$, $a_1 = 3$

40) Find the complete solution to $a_n + 2a_{n-1} = n+3$ for $n \geq 1$ and with $a_0 = 3$.

UNIT-I I I

41) Draw a picture of the following graphs

(a) G=(V,E) where V={a,b,c,d,e} and E{{a,b},{b,c},{a,c},{a,d},{d,e}}
(b) G=(V,E) where V={a,b,c,d,e} and E{(a,a)(a,b),(b,c),(c,d),(e,d),(d,e)}

42) Let G be a non directed graph of size 12.Suppose that G has 6 verices of degree 3 and the rest have degrees less than 3.Determine the minimum number of vertices G can have.

43) Prove that in any non directed graph there is an even number of vertices of odd degree.

44) Draw the graph of K2,5

45) Determine the number of edges in K4 ,C5 ,P5

46) Prove that a tree with n vertices has exactly n-1 vertices.

47) If G is a non trivial tree then G contains at least 2 vertices of degree 1

48) Explain the Kruskal's Algorithm for finding a minimal spanning tree

49) Define the terms Directed Tree, Binary Tree, Planargraph, Planegraph

50) Define the terms Bridge, Cut Vertex, Spanning Tree and give examples.

51) State and prove Euler's Formula.

52) A complete plane graph K_n is planar iff $n \leq 4$

53) Give an example of a connected plane graph such that:

(a) $|E| = 3|V| - 6$ (b) $|E| < |V| - 6$

54) Suppose that G is a connected plane graph with less than 12 regions and such that each vertex of G has degree ≥ 3Then prove that G has a region of degree ≤ 4.

55) What is the chromatic number of a Cycle and Tree?

56) Prove that every simple planar graph is 5-colorable

57) Show that a simple connected planar graph with 17 edges and 10 vertices cannot be colored with 2 colors.

58) Find the chromatic number of aWheel Graph of order 5

59) Define the terms Euler path, Euler circuit, Hamilton path and Hamiltonian graph.

60) Let G be a diagraph. Then the following are equivalent:

1. G is quasi – strongly connected.
2. There is vertex r in G such that there is a directed path from r to all the remaining vertices of G

UNIT-I V

61) Prove or disprove the following:
(a)Asymmetry implies antisymmetry
(b)Antisymmetry implies asymmetry.

62) Let A be the set of positive integers. Define R on A by (a,b)ϵ Riff a divides b or b divides a. Show that R is reflexive and symmetric but not transitive.

63) For any positive integer m, the relation $\equiv \pmod m$ is an equivalence relation on integers.

64) Define the terms Partial ordering, Poset.Reflexive, symmetry, transitive, asymmetry.

65) Define the terms Boolean algebra, literal, and atom.

66) Prove $a+a = a$ and $a.a = a$, $\forall\ a \epsilon B$.

67) State and prove Absorption laws.

68) State and prove De Morgan laws.

69) S.T. a + 1 = 1 and a. 0 = 0, ∀ a∈B

70) ∀ a∈B, there exists a unique complement ā

71) Obtain the sum of products canonical forms of (1) $X_1 + X_2$ (2) $X_1 \bar{X}_2 + X_3$

72) Minimize the ∑m (1, 2, 3, 13, 15).

73) Minimize the ∑m (0, 2, 10, 11, 12, 14).

74) Minimize the ∑m (1, 5, 6, 7, 11, 12, 13, 15).

75) Minimize the following using map technique $f = AB\bar{C}D + ABC\bar{D} + B\bar{C}D + \bar{A}BC\bar{D}$

76) Minimize the following using map technique $f = B\bar{C}D + A\bar{C}\bar{D} + AB\bar{C}D + A\bar{B}\,\bar{C}\,D$

77) Simplify the expressions $x\bar{y}(z + \bar{w}) + x\bar{y}(z + \bar{w}) + xy\bar{z}$ by using the rules of Boolean algebra.

78) Simplify the expressions $x + \bar{y}z + \bar{w}(x + \bar{y}z)$ by using the rules of Boolean algebra.

79) Prove that in any Boolean algebra if a≥z and a ≠ z, then a$\bar{z}$≥c for some atom c.

80) Prove that if a_1 and a_2 are two atoms in a Boolean algebra such that $a_1 a_2 \neq 0$

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FACULTY OF SCIENCE

B.A. / B.Sc. – III (Practical) Examination

Subject: **Mathematics (New Syllabus)**

Paper - IV(e) : Number Theory

QUESTION BANK

[w.e.f. Annual 2011]

Time : 3 Hours Max. Marks : 50

Unit – I

1. Use the Division Algorithm to establish that
   (a) the square of any integer is either of the form 3K or 3K+1
   (b) the cube of any integer has one of the forms 9K, 9K+1 or 9K+8.

2. For $n \geq 1$, use mathematical induction to establish of the following divisibility statements

   (a) $5 \mid 3^{2n+1} + 2^{n+1}$

   (b) $24 \mid 2.7^{n} + 3.5^{n} - 5$

3. For a nonzero integer a, show that gcd(a,0) = |a|, gcd (a,a) = |a|, and gcd(a,1) = 1.

4. For any integer a, show that
   (a) gcd (2a+1, 9a+4) = 1
   (b) gcd (5a+2, 7a+3) = 1

5. (a) If gcd (a,b) = 1 and gcd (a,c) = 1, then gcd (a,bc) = 1
   (b) If gcd (a,b) = 1, then gcd $(a^2, b^2) = 1$.

6. Use the Euclidean Algorithnm to obtain integers x and y satisfying
   (a) gcd (56, 72) = 56x + 72y
   (b) gcd (119, 272) = 119x + 272y.

7. If gcd (a,b) = 1, then gcd (a+b, a-b) = 1 or 2.

8. If gcd (a,b) = 1, then gcd (1+b, ab) = 1.

9. Determine all solutions in the integers of the Diophantine equation 56x + 72y = 40.

10. (a) Prove that the Diophantine equation ax + by + cz = d is solvable in the integers if and only if gcd (a,b,c) divides d.

    (b) Find all solutions in the integers of 15x + 12y + 30z = 24.

11. (a) Find the remainders when 2^{50} and 41^{65} are divided by 7.

    (b) What is remainder when the sum $1^5 + 2^5 + 3^5 + \ldots + 99^5 + 100^5$ is divided by 4?

12. Prove that, for any integer a, the units digit of a^2 is 0, 1, 4, 5, 6 or 9.

13. Establish the following divisibility criteria.

    (a) An integer is divisible by 2 if and only if its units digit is 0, 2, 4, 6 or 8.

    (b) An integer is divisible by 3 if and only if the sum of its digits is divisible by 3.

14. Find the remainder when 4444^{4444} is divided by 9

15. Determine the last three digits of the number 7^{999}.

Contd. 2.

16. Solve the following linear congruences.

(a) $25x \equiv 15 \pmod{29}$ (b) $34x \equiv 60 \pmod{98}$ (c) $140x \equiv 133 \pmod{301}$

17. Solve each of the following sets of simultaneous congruences

(a) $x \equiv 1 \pmod 3$, $x \equiv 2 \pmod 5$, $x \equiv 3 \pmod 7$

(b) $2x \equiv 1 \pmod 5$, $3x \equiv \pmod 6$, $4x \equiv 1 \pmod 7$, $5x \equiv 9 \pmod{11}$

18. Find an integer having the remainders 1, 2, 5, 5 when divided by 2, 3, 6, 12 respectively.

19. Determine all solutions in the positive integers of the Diophantine equation $18x + 5y = 48$.

20. Prove that the integer $53^{103} + 103^{53}$ is divisible by 39, and that $111^{333} + 333^{111}$ is divisible by 7.

Unit – II

21. Verify that $18^{\delta} \equiv 1 \pmod{7^K}$ for K = 1, 2, 3.

22. Derive each of the following congruences
(a) $a^7 \equiv a \pmod{42}$ for all a. (b) $a^{13} \equiv a \pmod{3.7.13}$ for all a.

23. If gcd (a,30) = 1, show that 60 divides $a^4 + 59$.

24. Find the units digit of 3^{100} by the use of Fermat's theorem.

25. Verify that 4 (29) + 5 is divisible by 31.

26. Arrange the integers 2, 3, 4, ...,21 in pairs a and b with the property that (mod 23).

27. Given a prime number P, establish the congruence

$(P-1)! \equiv (P-1) \pmod{1 + 2 + 3 + \ldots + (P-1)}$.

28. Show that $18! \equiv -1 \pmod{437}$.

29. (a) Find the remainder when 15! is divided by 17.

(b) Find the remainder when 2(26!) is divided by 2.9.

30. Verify that $\tau(n) = \tau(n+1) = \tau(n+2) = \tau(n+3)$ holds for n = 3655 and 4503.

31. Find the form of all positive integers n satisfying $\tau(n) = 10$. What is the smallest positive integer for which this is true?

32. If n is a square-free integer, prove that $\tau(n) = 2^r$, where r is the number of prime divisors of n.

33. Prove that
(a) $\tau(n)$ is an odd integer if and only if n is a perfect square
(b) $\sigma(n)$ is an odd integer if and only if n is a perfect square or twice a perfect square.

34. Show that $\sum_{d|n} \frac{1}{d} = \frac{\sigma(n)}{n}$ for every positive integer n.

35. For each positive integer n, show that $\mu(n).\mu(n+1).\mu(n+2).\mu(n+3) = 0$

Contd. 3.

36. If the integer n > 1 has the prime factorization

$n = p_1^{k_1} \cdot p_2^{k_2} \cdots p_r^{k_r}$, then prove that $\sum_{d|n} \mu(d)\tau(d) = (-1)^r$.

37. If the integer n > 1 has the prime factorization

$n = p_1^{k_1} \cdot p_2^{k_2} \cdots p_r^{k_r}$, then prove that $\sum_{d|n} \mu(d)\sigma(d) = (-1)^r p_1 p_2 \ldots p_r$.

38. Find the highest power of 5 dividing 1000! and the highest power of 7 dividing 2000!

39. Verify that 1000! terminates in 249 zeros.

40. For what values of n does n! terminate in 37 zeros?

Unit – III

41. Calculate $\varphi(1001)$, $\phi(5040)$ and $\phi(36{,}000)$.

42. Show that the integers $m = 3^K.568$ and $n = 3^K.638$ where $K \geq 0$ satisfy simultaneously $\tau(m) = \tau(n)$, $\sigma(m) = \sigma(n)$, $\phi(m) = \phi(n)$.

43. Assuming that d/n, prove that $\phi(d) / \phi(n)$.

44. Use Euler's theorem to establish the following

(a) For any integer a , $a^{37} \equiv a \pmod{1729}$

(b) For any integer a, $a^{33} \equiv a \pmod{4080}$.

45. If m and n are relatively prime positive integers, prove that $m^{\phi(n)} + n^{\phi(m)} \equiv 1 \pmod{4080}$.

46. Find the units digit of 3^{100} by means of Euler's theorem.

47. (a) If gcd (a,n) = 1, show that the linear congruence $ax \equiv b \pmod{n}$ has the solution $x \equiv b\, a^{\phi(n)-1} \pmod{n}$.

(b) Use part (a), solve the congruence $ex \equiv 5 \pmod{26}$.

48. Confirm that $\sum_{d|30} \varphi(d) = 36$.

49. Solve the following quadratic congruences

(a) $x^2 + 7x + 10 \equiv 0 \pmod{11}$ (b) $3x^2 + 9x + 7 \equiv 0 \pmod{13}$.

50. Prove that the quadratic congruence $6x^2 + 5x + 1 \equiv 0 \pmod{p}$ has a solution for every prime p.

51. Show that 3 is a quadratic residue of 23, but a non-residue of 31.

52. Find the value of the following Legendre symbols

(a) $\left(\frac{19}{23}\right)$ (b) $\left(\frac{20}{31}\right)$ (c) $\left(\frac{-72}{131}\right)$

Contd. 4.

53. Use Gauss's Lemma to compute each of the Legendre symbols below.
(a) $\left(\frac{8}{11}\right)$ (b) $\left(\frac{7}{13}\right)$ (c) $\left(\frac{15}{19}\right)$

54. If P ≡ 7 (mod 8), show that P/2 - 1.

55. If P ≡ 1 (mod 4), prove that $\sum_{a=1}^{p}$ (a/p) = 0.

56. Evaluate the following Legendre symbols
(a) (1234 / 4567) (b) (3658 / 12703)

57. Determine whether the following quadratic congruences are solvable
(a) $x^2 \equiv 219 \pmod{419}$ (b) $3x^2 + 6x + 5 \equiv 0 \pmod{89}$.

58. Verify that if p is an odd. Prime. then

$$(-2/p) = \begin{cases} 1 & \text{if } p \equiv 1 \pmod 8 \text{ or } p \equiv 3 \pmod 8 \\ -1 & \text{if } p \equiv 5 \pmod 8 \text{ or } p \equiv 7 \pmod 8 \end{cases}$$

59. Establish each of the following assertions
(a) (5/p) = 1 if and only if p ≡ 1, 9, 11 or 19 (mod 20)
(b) (6/p) = 1 if and only if p ≡ 1, 5, 19 or 23 (mod 24).

60 Using the Generalized Quadratic Reciprocity Law, determine whether the congruence $x^2 \equiv 231 \pmod{1105}$ is solvable.

Unit – IV

61. Prove that the integer $n = 2^{10}(2^{11}-1)$ is not a perfect number.

62. If n is a perfect number, prove that $\sum_{d|n} \frac{1}{d} = 2$.

63. Prove that every even perfect number is a triangular number.

64. Find the last two digits of the perfect number $n = 2^{19936}(2^{19937} - 1)$.

65 If n > 2 is an even perfect number, prove that n ≡ 4 (mod 6).

66. Prove that the Mersenne number M_{13} is a prime.

67. Express each of the primes 7, 19, 37, 61 and 127 as the difference of two cubes.

68 Prove that the Mersenne number M_{29} is composite.

69. Prove that $641 \mid F_5$.

70. For n > 0, prove that each of the numbers $2^{2^n} + 5$ is composite.

71. For n ≥ 2, show that the last digit of the Fermat number $F_n = 2^{2^n} + 1$ is 7.

72 Establish that $2^{2^n} - 1$ has at least n distinct prime divisors.

73. For any Fermat number $F_n = 2^{2^n} + 1$, establish that $F_n \equiv 5$ or $8 \pmod 9$.

Contd. 5.

74. Prove that 3, 5 and 7 are quadratic nonresides of any Fermat Prime Fn.

75. For $n \geq 1$, show that gcd (Fn, n) = 1.

76. Represent each of the primes 113, 229 and 373 as a sum of two squares.

77. Establish each of the following assertions.
(a) Each of the integers 2^n, where n = 1, 2, 3, ..., is a sum of two squares.
(b) If $n \equiv 3$ or 6 (mod 9), then n cannot be represented as a sum of two squares.

78. Prove that a prime P can be written as a sum of two squares if and only if the congruence $x^2 + 1 \equiv 0 \pmod{P}$ admits a solution.

79. Without actually adding the squares, confirm that the following relations hold.
(a) $1^2 + 2^2 + 3^2 + ... + 23^2 + 24^2 = 70^2$
(b) $2^2 + 5^2 + 8^2 + ... + 23^2 + 26^2 = 48^2$

80. Express the integers 231, 391 and 2109 as sums of four squares.

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FACULTY OF SCIENCE

B.Sc. III Year (PRACTICAL) Examination
(with effect from Annual 2011)

Subject: Microbiology (New Syllabus)

Paper-III

QUESTION BANK

Time: 3 Hours Max. Marks: 50

I. Major Experiment Questions (20 marks)

1. A clinical specimen isolated from a patient (wound infection / throat infection / urine infection) is provided to you. Identify the etiological agent by its cultural, microscopic and biochemical reactions.
2. Identify different types of Leucocytes present in the blood sample by Leishman's staining method.
3. A blood sample is provided to you. Count the number of RBCs / WBCs per cu.mm.
4. A serum sample is provided to you. Perform quantitative slide test for VDRL and give the report.
5. A serum sample is provided to you. Perform semi quantitative slide test for WIDAL and give the report.

II. Minor Experiment Questions (10 marks)

6. Estimate the amount of haemoglobin in the given blood sample by Sahli's method.
7. A serum sample from a patient of suspected typhoid is provided to you. Perform WIDAL qualitative test and give the report.
8. A serum sample is provided to you. Perform qualitative test for VDRL and give the report.
9. Perform blood grouping and Rh typing and report the results.
10. Determine the phenol coefficient of the given test disinfectant.
11. Identify the pathogenic bacteria based on cultural characteristics on the given medium.
12. Demonstrate PMNs in the given blood sample by Leishman's staining.
13. Determine the drug of choice for the given pathogen (provide 2 pathogens and minimum of 4 antibiotics for each organism).

III. Specimens for Spotting **(5x3=15 marks)**

14. ESR Instrument / Calculation
15. Antisera (Anti-A, Anti-B, Anti-D)
16. Ouchterlony double diffusion
17. Blood Agar
18. Mannitol salt Agar (inoculated)
19. Mac. Conkey's Agar (inoculated)
20. Cetrimide Agar (inoculated)
21. Simmon's citrate slants (positive and negative results)
22. Indole test (positive and negative results)
23. Mycobacterium tuberculosis (slide)
24. Plasmodium parasite (slide)
25. Entamoeba histolytica (slide)
26. Candida albicans (slide)
27. Staphylococcus (slide)
28. Streptococcus (slide)

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FACULTY OF SCIENCE

B.Sc. III Year (PRACTICAL) Examination
(with effect from Annual 2011)

Subject: Microbiology (New Syllabus)

Paper-IV

QUESTION BANK

Time: 3 Hours Max. Marks: 50

I. Major Experiment Questions (20 marks)

1. A sample of alcoholic fermented broth is provided to you. Find out the quantity of alcohol present in it by colorimetry and prepare your own standard graph. Calculate the fermentation efficiency (other required data for calculation of yield to be provided by examiners).

2. A sample of alcoholic fermented broth is provided to you. Find out the amount of left over sugar present in it by colorimetry and prepare your own standard graph. Calculate the fermentation efficiency (other required data for calculation of yield to be provided by examiner).

3. An industrial / sewage water sample is provided to you. Find out the amount of dissolved oxygen present in it and determine the B.O.D. of the sample (required data required for B.O.D. calculation to be provided by examiners).

4. Enumerate the total micro flora (Rhizosphere / Non Rhizosphere) and identify any two organisms (bacteria / fungi) from the given plate by cultural and staining properties.

5. Find out the amount of ascorbic acid present in the sample provided to you by titrimetric method.

II. Minor Experiment Questions (10 marks)

6. Evaluate the bacteriological quality of the given milk sample by performing Methylene blue Reduction Test.

7. Fermented broth of citric acid is provided to you. Find out the amount of citric acid by titrimetry / colorimetry.

8. A fungal spoiled food sample is provided to you. Identify the fungal organisms present in the sample responsible for spoilage.

9. A food sample spoiled by bacterial contamination is provided to you. Identify the bacterial contaminant by microscopic observation.

10. A water sample was inoculated for presumptive test and the tubes with growth and provided. Find out the coliform count by MPN method and report.

11. A water sample was found positive in the presumptive test and is further tested for confirmation on suitable medium plate and is given to you. Identify the same for its growth on plate and microscopic observation.

12. A source sample inoculated and grown on starch agar plates for amylolytic organisms is provided to you. Test for amylolytic activity by qualitative test.

13. Root nodule of a leguminous plant is provided to you. Locate the bacteriod zone by section cutting.

III. Specimens for Spotting (5x3=15 marks)

14. Yeast (slide) for industrial importance
15. Aspergillus sp.(slide) for industrial importance
16. Bacillus sp.(slide) for industrial importance
17. VAM
18. Spoiled Bread
19. Spoiled fruit / vegetable
20. E.coli on EMB agar plate
21. Curdling bacteria (Streptococcus / Lactobacillus) slide
22. Rhizobium on YEMA medium
23. Crowded plate
24. Tikka disease of ground nut
25. Citrus Canker
26. Little leaf of brinjal
27. Bhendi yellow vein mosaic
28. Tomato leaf curl
29. Powdery Mildew
30. Rust
31. Smut
32. DCPIP Reagent (labeled)
33. Root nodules
34. Azotobacter / Azospirillum (slide)

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With effect from Annual 2011
Subject: Zoology (New Syllabus)
Paper III: (Animal Physiology, Genetics & Evolution)

Question Bank

Time: 3 hrs **Marks: 50**

Note: Submit the write up of procedure for questions I & II before start of the experiments.

QI. Identify the Unknown samples A, B & C by performing the mentioned test. Write brief procedure and report your results. 5+15+5 = 25

1. Molisch Test, Biuret Test, Nessler's Test.
2. Fehling Test, Millon's Test, Test for Uric acid.
3. Test for Urea, Test for sulphur containing amino acid and Molisch Test.
4. Benedicts test, Biuret test, sudan IV dye.
5. Tests for Urea, Uric acid and Ammonia.
6. Picric acid test, Biuret test, sudan Black B-test.
7. Estimate unit oxygen consumption in crab.
8. Perform a test for demonstration of salivary amylase
9. Molisch test, Biuret test and Iodine test.
10. Biuret test, Test for Ammonia & Fehling test
11. Iodine test, Millon's test and Nessler's reagent
12. Fehiling test, Millon test and test for Uric acid
13. Millon's Test, Benedicts Test, Nesslers Test
14. Xanthoprotein test, Molisch test, Sudan dye test
15. Benedicts test, Nesselers test and Iodine test
16. Biuret test, Picric acid test and Nesslers test
17. Test for Urea, test of sulphur containing amino acid and test for reducing sugar
18. Test for tyrosine containing amino acid test, test for non reducing sugar and test for Uric acid

QII. Genetics Experiments 8+2 = 10

19. Report your blood group by performing a suitable test and comment on your result

20. Karyotyping of human chromosomes (Human karyotype figure on paper should be cut in to different sets of chromosomes and students are asked to arrange them in an order and comment on the idiogram)

21. Identification of genetic syndromes given on charts

QIII. Problems on blood grouping. 5

22. What will be the phenotype, as to blood groups, of offsprings of parents of the following genotypes for blood groups: a) $I^A i \times I^B i$ b) $I^A I^B \times I^B i$; c) $I^B i \times I^B i$.

23. One parent is group A and the other group B, but all four groups are represented among the children. Determine the genotype of parents.

24. Both parents are group A, but three-fourths (3/4) of the children belong to group A and one fourth to group 0. Determine the genotype of parents.

contd..2

QIV. Problems on monohybrid ratios and dihybrid ratios. **5**

25. If a plant homozygous for tall is crossed with one homozygous for dwarf, what will be the appearance of the F_1; of the F_2; of the offspring of a cross of F_1 with its tall parent; with its dwarf parent?

26. Let the allele for tall be represented by *T* and the allele for dwarfness by *t*. what will be the gametes produced by the parents and the height of the offspring (tall or dwarf) from each of the following crosses: a) *Tt* X *tt* b) *TT* X *Tt* c) *Tt* X *Tt*

27. A certain polled bull is bred to three cows. With cow A, which is horned, a polled calf is produced; with cow B, also horned, a horned calf is produced; with cow C, which is polled, a horned calf is produced. What are the genotypes of the four parents, and what further offspring, in proportions would you expect from these matings? In cattle, the polled or hornless condition P is dominant over the horned, *P*.

28. Assume that a wild-type female *Drosophila, BB SS,* with normal gray body and red-coloured eyes is mated with a mutant-type male, *bbss*, with black-body colour and sepia-coloured eyes. By following the general directions, determine the F1 genotype. After mating F_1 X F_1, what classes of flies may be expected in the F_2 generation?

29. A student mated a wild-type female *Drosophila, PrPrEE* with normal red coloured eyes and normal gray body a mutant-type male fly, *prpree*, with purple coloured eyes and ebony body. The males and females of the F1 generation were all normal wild flies with red eyes and gray body. By mating F1 males to the F1 females, and F2 generation was obtained which consisted of 96 wild-type flies with red eyes and gray body, 38 files with purple eyes and gray body, 34 files with red eyes and ebony body, and 12 flies with purple eyes and ebony body. Explain the genetical and biological principles basic to these results.

30. When a wild-type female *Drosophila, VVSS*, with normal long wings and normal red eyes is mated to a mutant type male fly *vvss*, with (short) vestigial wings and (brown) sepia-eye colour, the F_1 generation consists of normal flies. A student in the laboratory mated the three F_1 females of this cross to an F_1 male and counted 223 wild-type flies with normal long wings and red eyes, 70 flies with normal red eyes and vestigial wings 73 flies with normal long wings and sepia eyes, and 24 flies with vestigial wings and sepia eyes. Explain the genetics of this cross with emphasis on the free assortment of genes.

QV. Record **5**

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Faculty of Science
B.Sc. III yr (Practical Examination 2010)
Zoology New Syllabus
Paper III: (Animal Physiology, Genetics & Evolution)
Model Question Paper

Time: 3 hours Marks: 50

Note: Submit the write up of procedure for questions I & II before start of the experiments

QI	-	3	-	(25 marks)
QII	-	19	-	(10 marks)
QIII	-	22	-	(5 marks)
QIV	-	26	-	(5 marks)
QV	-	Record	-	(5 marks)

Zoology

PRACTICAL PAPER – III

90 hrs
(3 hrs/week)

ANIMAL PHYSIOLOGY

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

1. Identification of carbohydrates, proteins and lipids.
2. Unit oxygen consumption in an aquatic animal (locally available fish species *Catla*, *Rohu* or *Tilapia*).
3. Quantitative analysis of excretory products.
4. Demonstration of salivary amylase.

GENETICS

1. A, B, O blood group identification.
2. Problems based on Blood grouping.
3. Karyotyping of human chromosomes (Human karyotype figure on paper should be cut in to different sets of chromosomes and students are asked to arrange them in an order and comment on the idiogram).
4. Identification of genetic syndromes given on charts.
5. Problems based on Mendelian inheritance (at least one problem for each for the laws of segregation and law of independent assortment).

REFERENCE BOOKS

1. 'Essentials of Animal Physiology' by S. C. Rastogi.'
2. 'Animal Physiology' by H. C. Nigam.
3. 'Biology' by Campbell & Reece.
4. 'Animal Physiology' – Agarwal, R.A. Srivastava, Kaushal, Anil and Kumar.
5. 'Animal Physiology and Biochemistry' by Dr. B. Annadurai.
6. 'Principles of Animal Physiology' by Christopher D. Moyes, Patricia M Schulte.
7. 'Biology: The Science of Life' by R. A. Wallace, G. P. Sanders & R. J. Ferl.
8. 'Biology: Concepts and Applications' by Starr
9. 'Genetics' Vol-I. by C. B. Powar., Himalaya Publishing House Pvt. Ltd.
10. 'Genetics' by Strickberger.
11. 'Genetics' by P. K. Gupta.
12. 'Cell Biology, Gentics, Evolution and Ecology' by P. S. Varma and V. K. Agrawal; S. Chand and Company.
13. 'Principles of Gentics' by S. B. Basu and M. Hossain.
14. 'Principles of Genetics' by Gardner, Simmons & Smustard.
15. 'Principles of Genetics' by H. Robert & Tamasin.
16. 'Genetics' by P. S. Verma & V. K. Agarwal.
17. 'Organic Evolution' by M. P. Arora & Chandrakanta.
18. 'Organic Evolution' by N. Arumugam.
19. 'Animal nutrition' by P. Mc Donald, R. A. Edwards, J. F. D. Greenhalgh, C. A. Morgan.

Faculty of Science
B.Sc. III yr Practical Examination
with effect from Annual 2011
Subject: Zoology (New Syllabus)
Paper IV: (Fisheries and Aquaculture, Clinical Science and Animal Biotechnology)

Question Bank

Time: 3 hrs **Marks: 50**

Note: Submit the write up of procedure for question I before start of the experiments.

QI. Haematology **10+3 = 13**

1. Enumerate total leucocytes in the given blood sample. Write brief procedure and comment on your results.
2. Find out the total Red blood cell count in the blood sample provided to you. Write brief procedure and comment on your results.
3. Estimate the amount of percent haemoglobin in the blood. Give a write up on method of estimation and add a note on significance of your findings.
4. Determine the amount of haemoglobin in grams present in the blood sample provided to you. Give brief working procedure and comment on your results.

QII. Identify any four paraisites (two from protozoans and two from helminthes) from the given slides. Identification, Classification, diagram and description carries ½ mark each. **(4x2 = 8)**

5. *Entameoba histolytica*
6. *Giardia intestinalis*
7. *Balantidium coli*
8. *Trypanosana gambiense*
9. *Plasmodium* – any one stage
10. *Taenia solium*
11. Male *Ascaris*
12. Female *Ascaris*
13. *Entrobius vermicularis*
14. *Drancanculus medinensis*
15. *Ancylostoma duodenale*

III. Identify classify and give reasons for identification of the following four fishes and two prawns **(6 x 3 = 18)**

Fishes:

16. *Labeo rohita*
17. *Catla catla*
18. *Cirrhina mrigala*
19. *Cyprinus carpio*
20. *Ctenopharyngodon idella*
21. *Hypophthalamichthys molitrix*
22. *Channa striatus*
23. *Channa punctatus*
24. *Clarias batrachus*
25. *Heteropneustes fossilis*
26. *Chanos chanos*
27. *Mugil cephalus*
28. *Lates calcarifer*
29. *Liza persia*
30. *Stromateus niger*
31. *Oreochromis mossambicus*
32. *Wallago attu*
33. *Etroplus suratensis*
34. *Ompok bimaculatus*
35. *Amblypharyngodon mola*

Contd..2

Prawns:

36. *Macrobrachium rosenbergii*
37. *Macrobrachium molcolmsonii*
38. *Penaeus monodon*
39. *Penaeus indicus*
40. *Penaeus semisulcatus*
41. *Metapenaeus affinis*
42. *Metapenaeus brevicomis*
43. *Metapenaeus dobsoni*

IV. Identify chart /diagram one from section A and one from section B. write a note on their biotechnological significance(2x3 = 6)

A.

44. Plasmid insertion
45. Bacteriophage
46. Down's syndrome
47. Klinefelter's syndrome
48. Turner syndrome

B.

49. Dolly
50. Tracy
51. Solman fish
52. Chimeras
53. Construction of transgenic mouse.

V. Record (5 marks)

Zoology

PRACTICAL PAPER – IV

90 hrs
(3 hrs/week)

FISHERIES AND AQUACULTURE

1. Identification of important freshwater and marine edible fishes (Minimum 10 species)
2. Identification of important edible prawns (Minimum 5 species)
3. Field Work - Field work is compulsory. Field trip to local fisheries/ aquaculture unit is to be conducted and certified field note book should be submitted at the time of practical examination.

CLINCIAL SCIENCE

1. Identification of the following protozoan parasites.
   a) *Entamoeba histolytica*
   b) *Giardia intestinalis*
   c) *Balantidium coli*
   d) *Trypanosoma gambiense*
   e) *Plasmodium* – Any two stages

2. Identification of the following helminth parasites.
   a) *Taenia solium*
   b) *Ascaris* (Male and female)
   c) *Enterobius vermicularis*
   d) *Dracanculus medinenesis*
   e) *Ancylostoma duodenale*

3. Blood cell counting – RBC and WBC.
4. Estimation of Haemoglobin (Sahli's method).

ANIMAL BIOTECHNOLOGY

1. Identification of vectors (charts or photographs).
2. Identification of genetic disorders (charts or photographs).
3. Identification of transgenic animals (charts or photographs).

REFERENCE BOOKS

1. 'Immunology' 5th edition. 2003. - R. A. Goldsby, T. J. Kindt, B. A. Osborne and J. Kuby. W. H. Freemann and Company, Newyork.
2. 'Essentials of Immunology' – Ivanriots.
3. 'A text book of Immunology and Immunotechnology' by B. Annadurai, S. Chand Publicatins.
4. ' Principles of Immunology' N.V. Shastri., Himalaya Publishing hOuse Pvt. Ltd.
5. 'Genetic Engineering' by Mohan P. Arora., Himalayan Publishers
6. 'Practical Immunology' – Talwar.
7. 'Introduction to basic Molecular Biology Techniques' by G. R. Naik, Himalaya Publishing House Pvt. Ltd.
8. 'Immunology' – I. Kannan.
9. 'NMS Immunology' – Richard M. Hyde.
10. 'Text book of Immunology' – C. V. Rao.
11. 'Biology' – Campbell and Reece.
12. 'Medical Zoology' – Sobti.
13. 'Parasitology' – Chandler
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