The Berar General Education Society
Sant Gadge Baba Amravati University
Sitabai Arts, Commerce & Science College. Akola
Computer Science Department

Time: 03 Hours | Prelims examination | 80 Marks
B.Sc: 1 Year Sem II | Session 2017-2018 | Data Structure & Advanced C

Question number 1 carries 8 marks & all other questions carry 12 marks each. All question are compulsory

Fill in the blanks: 2M

1. A collection of homogeneous data elements is called as _____
2. Finding the location of given element is called _____
3. A function can call itself. This phenomenon is called as_____
4. LIPO stands for_____

Choose correct alternative 2M

1. Bubble sort algorithms is used for:-
   a. (d) ordering (a) searching (b) insertion (c) deletion
2. Identify the wrong statement
   a. (a) fputc(65) (b) fputs (x)
3. A variable accessible only within the function is called as
   a. (a) global (b) local (c)External (d) register
4. In C language, a string can be completely printed using the format specifies_____
   a. (a)%d (b)%f (c)%s (d)%c

Answer in one sentence: 2M

1. What is an algorithm?
2. What is a pointer variable?
3. What is the difference between structure and union?
4. What is a nested structure?

What is a traversal of linear army? Write an algorithm for it 6
What is data structure? What are the various operations to be performed on data structure? 6
OR
How the queue is represented in a memory? Explain with example 6
Write an algorithm to insert into and delete an element from a stack 6

What is a linked list? Write an algorithm to delete an element from linked list 6
Explain the applications of a linked list 6
OR
Draw and explain linked list with suitable example. 6
State and explain the differences between a queue and circular queue 6

What is binary tree? Draw the tree structure for the expression E=(A-B)((C*D)+E) 6
What is a selection sort? Write an algorithm for selection sort 6
OR
What is binary search tree? Explain with suitable example. 6
Explain the searching and sorting techniques for a binary tree 6

What is an array? How 2 dimensional array can be declared and initialized? Explain with example. 6

Write a program to demonstrate the use of global and local variables. 6

OR

What is a recursive function? Write a program to display the factorial of given integer using recursion. 6

Explain the following terms with respect to functions

(i)function prototype (ii)function definition (iii) Function calling. 6

What is a string? What operations can be performed on a string? Explain with example 6

Write a program to sort the strings using pointer. 6

OR

What is a pointer? Explain pointer arithmetic with suitable example. 6

Write a program in C to determine whether the entered string is palindrome or not. 6

What is structure? How it differs from array? Explain with suitable example. 6

Explain the following file handling functions with syntax and suitable example:

(i)fprintf() (ii)fread() (iii) fwrite() 6

OR

Explain the file opening modes in C. 6

Write a program to read &print information of student such as Roll no, Marks in three subjects and grade.6

The Berar General Education Society
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Computer Science Department

Time:03 Hours | Prelims examination | 80 Marks
B.Sc: II Year Sem IV | Session 2017-2018 | Advance C++ & Web Designing

(a) Fill in the blanks: - 2M

(i) Array is a collection of _____ elements.
(ü) The combination of two types of inheritance can be referred to as _____Inheritance.
(iü) DTD stands for _____
(iv) W3C stands for _____

(b) Choose correct alternative: - 2M

(i) Following is not a visibility mode:
(a) Public (b) Private (c) Protected (d) Derived

(ii) While overloading binary operator using friend function then operator op ( ) requires arguments.
(a) No (e) Two (b) One (ü) Four

(iii) CDATA stands for:
(a) Cashless Data (b) Character Data
(c) Change Data (d) Nous of the above

(iv) XMl. stands for:
(a) Extensible mark-up language (b) Exchangeable mark-up language
(c) Xerox mark-up language (d) none of the above

(c) Answer in one sentence each: 4M

(i) What is two dimensional array?
(ii)What is base class '?
(iii)What are the types of attributes '?
(iv)What is CSS?

Explain declaration and initialization of two dimcnsional array. 6
What is Operator Ovcrloading ? Explain with suitable example. 6
OR
Explain pointer to object with suitable example. 6
Write a program in C++ to overload unary ++ operator 6

Explain the hybrid inheritance with suitable example. 6
Definc class template with example. 6
OR
What is inheritance ? What are the types of inheritance ? 6
Define function template with suitable example. 6

Explain dynamic binding with example.	6
State and explain the rules for virtual function.	6
OR	
Explain hierarchy offile strcam classes.	6
Explain pointcrs to derived class with example.	6
State and explain the features of XML.	6
Creatc XML document to show employee details consisting of employee ID, employee name, department, salary.	6
OR	
Explain thc basic structure of XMI document.	6
Explain document prolong and docurnent instance.	6
What is DTD ? Explain intcmal and cxtcmal DTD with example.	6
What is attribute ? Explain its types.	6
OR	
Explain element content model with suitable example.	6
What is Entity ? Explain with suitable example.	6
Explain various features of XML schema.	6
Explain default and prefix declaralion of namespace.	6
OR	
Compare XML schema with DTD by giving suitable example.	6
Explain schema elements with suitable example.	6

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Time:03 Hours | Prelims examination | 80 Marks
B.Sc: III Year Sem VI | Session 2017-2018 | PL/SQL & Adv. VB

l. (A) Fill in the blanks and rewrite the following: 2M

i) The ____ mode opens a file for sequential output at the end of the file.

(ii) Combo box is the combination of Textbox and _____.

(iii) The PL/SQL function _____ is used to find smallest integer value that is greater than or equal to a number.

(iv)Statement to end your current transaction and make permanent all changes performed in the transaction.

B) Select the correct alterative and rewrite the following: 2M

(i) The PL/SQL data type _____ is used to store variable length character data.

(a) Integer (b) Number (c) VARCIIAR (d) Date

(ii) A _____ is a temporary work area created in the system memory when a SQL statement is executed.

(a) Rollback (b) Commit (c) Cursor (d) Save point

(iii) Which property is used for counting number of controls on the form?

(a) Form Count b) Count Form (c) Court (d) Print

(iv)Which of the following is not a style of Combo box control?

(a) Simple combo (b) Dropdown combo (c) Dropdown list (d) Combo

C) Answer the question in one sentence: 4M

(i) What is outer joins?

(ii) What is role?

(iii) What is the use of print method?

(iv)What is random access file?

2. Explain the following number functions with example:

(i) Greatest() (ii) FLOOR() (iii) TRUNC() 6

Explain the equi-join operation with suitable example. 6

OR

3. Explain the following data integrity constraints with example.

(i) Check (ii) Not null (iii) Primary key. 6

Explain the following character functions with example :

4. Explain the Dataquest supported by PL/SQL. 6

Explain the following terms : (i) Savepoint (ii) Rollback. 6

OR

5. Explain the following terms: (i) Commit (ii) Rollback Segment. 6

What is cursor? Explain possible operations with cursor. 6

6. Explain the types of privileges for database user 6

Explain the following commands with example:

(!) GRANT (n) REVOKE. 6

OR

7. Explain the various types of database users. 6

Explain the term data locks with suitable examples. 6

8. What is common dialog box control? Explain various dialog boxes in VB. 6

Explain the concept of multiple list box with suitable example. 6

OR

9. What is the use of combo box control? Explain WITH example. 6

Explain dynamic array in VB with suitable example. 6

10. State and explain the use of print method for writing text onto the form. 6

What is form collection? How forms can be accessing using subscript? Explain with example. 6

OR

11. State and explain how multiple forms can be used inside VB application. 6

Explain the use of count property with example. 6

12. Explain how read and write operation is performed on sequential access file. 6

Write a VB program to create random access file. 6

OR

13. Explain the various file opening modes in VB. 6

Explain following with examples:

0) CET statement (ii) PUT statement (iii) Close statement 6

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Time:03 Hours | Prelims examination | 80 Marks
B.Sc: 1 Year Sem II | Session 2018-2019 | Data Structure & Advanced C

Question number 1 carries 8 marks & all other questions carry 12 marks each. All question are compulsory

Q1 (A) Fill in the blanks 2M

1. Stack is _____ data structure.
2. A function call within itself is also called_____
3. String is collection of
4. Adding data items at the end of file is called_____ operation.

Q1 (B) Choose correct alternative: 2M

1. Traverse means
   (a) Visiting an elements (b) LIPO (c) Processing at end (d) FIFO
2. PUSH operation on stack means
   (a) Inserting an item (b) Deleting an item (c) Visiting an item (d) None of these
3. Concatenation means
   (a) Addition of element (b) Extracting string (c) Combining strings (d) None of these
4. EOF means
   (a) End of Function (b) End of File (c) End of fact (d) None of these

Q1 (C) Answer in one sentence (4)

1. What is searching?
2. What is POP operation?
3. What is Pointer?
4. What is use of fgetc()?

Define an Array. Explain the syntax of array declaration. How is one dimensional array processed? (6)
What is stack? What are the operations performed on stack? Explain it. (6)
OR
Write an algorithm to sort a list of n integer items. (6)
Enlist the operations performed on data structure. (6)

Describe the applications of linked list. (6)
Write an algorithm to traverse linked list (6)
OR
Write an algorithm to add an element into linked list. (6)
What is circular Queue? Explain with suitable example. (6)

Write an algorithm to transverse a tree in in-order. (6)
Write BINARY SEARCH algorithm (6)
OR
Explain inorder, preorder and postorder tree traversal with example. (6)
What is searching? Explain linear search algorithm with example. (6)

Explain function prototype Describe function calling and function returning with example. (6)
Write a program to add two matrices A mxn and B mxn. (6)
OR
What is function recursion? Write a program to calculate the factorial of given number a by using recursion technique. (6)
Describe prototype of one and two dimension array Explain its processing with example. (6)

Explain the following functions (1) streat() (ii) strcpy() (iii) strcmp() (6)
Write a program in C to print the transpose of given matrix. (6)
OR
Write a program to count number of vowels in the string. (6)
Explain pointer arithmetic with example. (6)

Explain the difference between structure and union WAP to illustrate structure (6)
Explain the functions (i) fgets() (ii) fputs() (iii) fwrite() (6)
OR
Describe the various I/O operation modes for a sequential file. (6)
Write a program to illustrate array of structure. (6)

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Time:03 Hours | Prelims examination | 80 Marks
B.Sc: II Year Sem IV | Session 2018-2019 | RDBMS & PL/SQL

Fill in the blanks:- 2M

(i) _____clause is used to sort the contents of table
(ii) _____ cursors are automatically created whenever SQL ,statement is executed.
(iii) _ _____ is used at SQL prompt to make changes permanent.
(iv) _____ datatype is uscd to store numerical data.

Choose the correct answer:- 2M

(i) section of SQL block hendles enor and abnormal condition.
(a) Decla.ation (b) Exception (c) Executable (d) Anonymous

(ii) Database object makes the group of database privilege.
(a) User (b) Role (c) tock (d) Data

(iii) User delined cursors are
(a) Implicit cursors (b) User defined cursor (c) Explicil cursors (d) Closing cursors

(iv) A_____ key is a field in one table that refers to the primary key in another table.
(a) Primary (b) Secondary (c) Foreign (d) Special

(C) Answer in one sentence : 4M
(i) What is cursor ?
(ii) What is boolean data type ?
(iii) What is difference between CHAR and VARCHAR ?
(iv) What is self join ?

3. (A) Describe architecture of database system with diagram. 6M
(B) Describe relational and network model of database system. 6M
OR

4. (A) Why darabase systems,t!€ preferred over convenlional file systcm ? 6M
(B) Explain the terms : (i) Data integrity (ii) Data redundancy. 6M

5. (A) What is E-R diagram ? Give various symbols used in it. 6M
(B) Desc bc the terms : (i) Functional dependency (ii) Normalization. 6M
OR

6. (A) Describe the terms : (i) Attribute (ii) Relation (iii) Domain. 6M
(B) What do you mean by nolmalization ? Describe BCNF. 6M

7. (A) Describe various data tyes in SQL. 6M
(B) Explain fotlowing with example :(i) INSERT (ii) UPDATE (iii) DELETE. 6M
OR

8. (A) Describe following with example : (i) CREATE (ii) DROP 6M
(B) What is clause ? Describe GROUP By and HAVING clause. 6M

9. (A) Explaio following numeric functions with suitable example. 6M
(i) ABs ( ) (ii) MoD ( ) (iii) GREATEST ( ). 6M
(B) What is character funcrion ? Describe followirg with example : (i) RPAD ( ) (ii) RTRIM ( ). 6M
OR

10. (A) Describe selfjoin with suitable example. 6M
(B) Explain following date-functions : (i) nextday ( ) (ii) lastday ( )(iii) ADD_Month ( ). 6M

11. (A) Explain FOR, statement in PL/SQL. 6M
(B) What are various cursor attributes ? Explain with example. 6M
OR

12. (A) What are components of PL/SQL block ? 6M
(B) Describ€ creation of before and after trigger. 6M

13. (A) Describe concept of SQL darabase security. 6M
(B) Explain syntax of GRANT and REVOKE statement with suitable example. 6M
OR

14. (A) Describe various categories of privileges. 6M
(B)What are various locking levels in pLlSeL ? Explain with example. 6M

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B.Sc: III Year Sem VI | Session 2018-2019 | PL/SQL & Adv. VB

(a) Fill in the blanks and rewrite the following:

(i) ___provide a way for your program to select multiple rows of data from the database and then process each row individually.

(ii) _____join is used to join a table to itself

(iii) _____property of timer control sets time in milliseconds.

(iv) _____ method of Listbox control is used to add items in the Listbox.

(b) Select the correct alternative:

(i) _____ cursors are declared and used by the users to process multiple rows, returned by SELECT tatement

(a) Implicit (b) Explicit (c) Internal (d) External

(ii) _____ command marks and saves the current point in the processing of transaction.

(a) Savepoint (b) Rollback (c) Select (d) None of these

(iii) Which is not a standard dialog box?

(a) Color Dialog (b) Font Dialog (c) Open Dialog (d) Zoom Dialog

(iv) The standard prefix for a dialog control is:

(a) dal (b) dia (c) dil (d) dlg

(c) Answer the following in one sentence:

) What is a transaction?

(ii) What is meant by Join?

(iii) What is the need of dialog box?

(iv) What is an Array?

2. (a) Explain following functions with examples :(i) LTRIM (ii) RTRIM (iii) DECODE. 6

(b) Explain the outer join operation with an example. 6

OR

3. (a) Explain the following SQL functions with example :(i) FLOOR(ii) LPAD (iii.) SQRT. 6

b) Explain the following ,with example : (i) Intersection (ii) Union. 6

4. (a) Explain PL/SQL control structures with example. 6

(b) Explain the following transaction processing commands with example :

(i) Rollback (ii) commit (iii) Savepoint 6

OR

5. (a) How to handle exception in PL/SQL? Explain with example. 6

(b) What are cursors? explain the types of cursors with example. 6

6. (a) Explain GRANT and REVOKE with example. 6

(b) How to create and grant the roles ? Explain. 6

OR

7. (a) What are Privileges and Roles ? Explain. 6

(b) Explain data locks with suitable example. 6

8. (a) Explain open dialog boxes with example. 6

(b) What is an Array? Explain initialization and declaration of array in VB. with example. 6

OR

9. (a) Explain file save dialog box with example. 6

(b) How to add and remove element in list box control? Explain with example. 6

10. (a) Explain form collector using the subscripts. 6

(b) How to place buttons on toolbar control? Explain with example. 6

OR

11. (a) What is the use of COUNT property '7 Explain with example. 6

(b)Explain placing text on lbr.ls with example. 6

12. Explain the following: (i) PUT statement (ii) GET statement. 6

How to lock a file? Explain. 6

OR

13. (a) Explain : (i) Write # statement (ii) Input # statement. 6

(b) Write a program in VB. for reading and writing from sequential file 6

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Time:03 Hours | Prelims examination | 80 Marks
B.Sc: 1 Year Sem II | Session 2021-2022 | Data Structure & Advanced C

Question number 1 carries 8 marks & all other questions carry 12 marks each. All question are compulsory

Q1 (A)Fill in the blanks 2M

1. Accessing each element of an array only once is called_____
2. Tree is _____ data structure.
3. The global variable is also called as
4. A record is collection of

Q1 (B) Choose correct alternative: 2M

1. The address of variable sum is got by using _____
   a. (a) Address (sum) (b) Address (sum) (c)@sum (d) Sum
2. The topmost element with a stack is called _____
   a. (a) Stack down (c) Stack pointer (b) Stack top (d) FILO
3. Finding the location of given elements is called_____
   a. (a) Sorting (b) Traversing (c)Searching (d)None
4. The variable declared within the function are called _____ variables.
   a. (a) Local (b) Global (c) Actual (d) Dummy

Q1 (C) Answer in one sentence: 4M

1. What is sorting?
2. What is file?
3. What is array?
4. What do you mean by pointer?

What is an array? How can it be represented in memory? Explain 6M
What is queue? Write an algorithm to delete an element from it. 6M
OR
Write an algorithm for PUSH and POP operation on stack. 6M
What is algorithm? Explain its characteristics. 6M

What is linked list? Show a linked list with a suitable having six nodes. 6M
Write an algorithm to traverse linked list. 6M
OR
What are the advantages and disadvantages of linked list over linear array? 6M
What is circular queue? Explain with suitable example. 6M

What is traversal of a binary tree? Explain various types of traversals with example. 6M
What is insertion sort? Write an algorithm for insertion sort. 6M
OR
Explain linear search algorithm with suitable example. 6M
What is binary tree? Draw the binary tree for the expression [A-B]+C (E/F) 6M

What is an array? How is one dimensional array declared and initialized? Explain with example. 6M
Explain various types of function calls with suitable program example. 6M
OR
Write a program in C to pass an entire array to a function. 6M
Explain actual and formal argument with a suitable example. 6M

Explain the following with example. (1) strcpy() (ii) strcat() (i) strcmp. 6M
Write a program using pointer to find smallest element of one dimensional array. 6M
OR
Explain the following terms. (1) Pointer to array (ii) Pointer comparison. 6M
Write a program to concatenate two strings without using Library function. 6M

Explain following file handling functions with syntax and suitable example.
(i) fgets()(ii) fputs (iii) fscanf() 6M
Explain the concept of array of a structure with suitable program example. 6M
OR
What is the use of a structure? How does it differ from union? Explain with example 6M
Write a program in C to count number of characters and words in a text file. 6M

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Time:03 Hours | Prelims examination | 80 Marks
B.Sc: II Year Sem IV | Session 2021-2022 | RDBMS & PL/SQL

1. (A) Fill in the blanks :
   (i) BCNF stands for _____.
   (ii) _____ clause is used to sort the contents of table.
   (iii) _____ function measures all the rows in entire table.
   (iv) _____ section is the execution section of PL/SQL. 2

   (B) Choose correct alternative :
   (i) Non key attribute of one table becomes primary key of another table is called _____.
   (a) Primary key (b) Foreign key
   (c) Super key (d) Candidate key
   (ii) _____ is not SQL component.
   (a) DCL (b) DML
   (c) DDL (d) DSL
   (iii) In outer join _____ operator combines matching and non matching rows of two tables.
   (a) + (b) %
   (c) * (d) –
   (iv) Hierarchical model has _____ connectivity.
   (a) One to one (b) One to many
   (c) Many to many (d) Many to one 2

   (C) Answer in one sentence :
   (i) What is primary key ?
   (ii) What is DBMS ?
   (iii) What is block in PL/SQL ?
   (iv) What is privilege ?

2. (A) Describe hierarchical database model with example. 4
   (B) Why database systems are more popular over conventional file system ? 6

OR

3. (A) Describe architecture of database system and explain with diagram. 6
   (B) What is relation ? Describe relational database model. 6

4. (A) What is E-R diagram ? Describe procedure to reduce E-R diagram into table. 6

(B) Describe the following terms :

(i) Functional dependency

(ii) Entity and entity set. 6

OR

5. (A) Describe the following terms :

(i) Attribute

(ii) Domain

(iii) Relation. 6

(B) What is normalization ? Explain 3NF with example. 6

6. (A) What is SQL ? Explain components of SQL. 6

(B) Describe various data types used in SQL with suitable example. 6

OR

7. (A) Describe the following commands with syntax and example :

(i) CREATE

(ii) RENAME

(iii) UPDATE. 6

(B) What is data integrity ? Give types of integrity constraints. 6

8. (A) Describe the following functions with example :

(i) POWER

(ii) SIGN

(iii) SIN. 6

(B) What is join ? Explain equi join with example. 6

OR

9. (A) Describe with syntax and example :

(i) INITCAP

(ii) INSTR

(iii) RTRIM. 6

(B) Describe various date functions with syntax and example. 6

10. (A) What is cursor ? How to use explicit cursor ? Describe with example. 6

(B) Describe loop control structure in PL/SQL with example. 6

OR

11. (A) Describe datatype support by PL/SQL with example. 6

(B) What are various cursor attributes ? 6

12. (A) Explain the following statements with syntax and example :

(i) GRANT

(ii) REVOKE. 6

(B) How to secure databases ? Explain. 6

OR

13. (A) What is transaction ? Describe various transaction control statements. 6

(B) Describe various levels of data locking in SQL. 6

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Time:03 Hours | Prelims examination | 80 Marks
B.Sc: III Year Sem VI | Session 2021-2022 | PL/SQL & Adv. VB

1. (A) Fill in the blanks and rewrite the following: 2M

(i) The PL/SQL function __ is used to find the absolute value.

(ii) When the table is joined with itself, it is called as_____.

(iii) The _____control contains the images you will place on the toolbar.

(iv) A _____ is the group of forms currently opened in your application.

(B) Select the correct alternative:

(i) The PL/SQL data type RAW is used to store_____

(a) Numbers (b) Binary data (c) Variable length strings (d) Characters

(ii) SQL security scheme is based on _

(a) Database (b) Client (c) User (d) Privileges

(iii) The _____ control generates responses based on computer's internal clock

(a) Time (b) Tuner (c) Date (d) Clock

(iv) A _____ data type is composed of prefixing various data types :

(a) Single b) Integer (c) User-defined (d) Variant

C) Answer the question in one sentence: 4M

(i) What is static array?

(ii) Which function returns the next unused file number?

(iii) What is meant by Domain?

(iv) What is savepoint ?

2. (a) Explain how to enforce data integrity on a relation. 6

(b) Explain the following character function with example

(i) LPAD (ii) RTRIM (iii) length (iv) Upper 6

OR

3. a) Explain Outer join with example. 6

b) Explain any six numeric functions with example. 6

4. a)Explain the block structure of PL/S()L with example. 6

b) Explain the data types supported by Pl./SQL. 6

OR

5. a) Explain the decision making statements supported by PL/SQL with example. 6

6. a) Explain the various types of database users. 6

b) Explain duties of database administrator. 6

OR

7. a) Explain the importance of establishing a security for the database. 6

b) Explain the concept of data locks for the security of a database. 6

8. a) Explain the procedure of producing colour dialog box with example. 6

b) Explain the following with example: (i) Static array (ii) Dynamic array. 6

OR

9. a) What is a common dialog box control ? Write a procedure to produce Save As dialog box. 6

b) Explain the following with properties: (i) Timer control (ii) List Box control. 6

10. a) State and explain how multiple forms in VB applications can be created and processed ?

b) Explain Print method for the following with example:

(i) Placing text on Form (ii) Format with print. 6

OR

11. a) What is Forms Collection? Explain count property for Forms Collection with example. 6

b) Explain the method of placing toolbar on forms with example. 6

12. a) Explain the following statements with example :

(i) Print # (ii) Write # (iii) Input # 6

b) Explain various file related commands with example. 6

13. a) What is a file ? Explain file opening modes with example. 6

b) What is random file ? Explain the use of put and get statements to process random file. 6

Sitabai Arts, Commerce & Science College Akola
Prelim Exam
Session 2021-22
B.Sc. I (Sem II)
Subject: English

ime: Three hour Marks : 80

1. Answer the following questions in **ONE** or **TWO** sentences each :

   (i) What is the difference between a Planet and a Star ?

   (ii) Why is it necessary to sign a contract in business deal ?

   (iii) What do you know about Jupiter ?

   (iv) What does the author mean by 'dismal pilgrimage' ?

   (v) What did the author do, while waiting for his turn for his photograph ? 5

2. Answer any **TWO** of the following questions :

   (i) What are the points of difference between the advertising profession and other professions ?

   (ii) Write a note on the major events that bring out humour in the lesson 'With the Photographer'.

   (iii) What precautions are to be considered by a businessman while forming contract ?

   (iv) How can Science render service to humanity ?

   (v) Bring out the difference between the Earth and the Sun. 10

3. Answer any **TWO** of the following questions :

   (i) What according to the mother, is the story of the origin of the Champak trees ?

   (ii) Summarise the poem 'To the Indian Who Died in Africa'.

   (iii) Describe the classroom as presented in the poem 'The Best of School'.

   (iv) Summarise the poem 'Ballad of the Landlord' by Langston Hughes. 10

4. Do as directed :

(i) Surplus water is _____ principal factor in causing soil erosion. (Use appropriate article) 1

(ii) Much of Indian agriculture depends _____ seasonal rainfall. (Use appropriate preposition) 1

(iii) Spring made everyone happy. (Change the voice) 1

(iv) RTI Act was _____ (enact) on 15 June, 2005. (Use appropriate form of verb) 1

(v) You can convince her. (Add a question tag) 1

5. Prepare a dialogue on the following situation (any **ONE**) :

(i) Sandy calls his friend Sumit who lives in Pune. He asks him about a nice hotel in good locality where his close relatives intend to stay for a week.

(ii) Vijay, who is with his sister Rekha, meets his colleague Pawan at the railway station. He introduces the two. 5

6. You are applying to a multi-national company for a position of Sales Manager. Prepare an application for the same. 5

Sitabai Arts, Commerce & Science College Akola
Prelim Exam
Session 2017-18
B.Sc. I (Seem II)
Subject: English

me: Three hour Marks : 80

1. Answer the following questions in **ONE** or **TWO** sentences each :

   (i) What is the difference between a Planet and a Star ?

   (ii) Why is it necessary to sign a contract in business deal ?

   (iii) What do you know about Jupiter ?

   (iv) What does the author mean by 'dismal pilgrimage' ?

   (v) What did the author do, while waiting for his turn for his photograph ? 5

2. Answer any **TWO** of the following questions :

   (i) What are the points of difference between the advertising profession and other professions ?

   (ii) Write a note on the major events that bring out humour in the lesson 'With the Photographer'.

   (iii) What precautions are to be considered by a businessman while forming contract ?

   (iv) How can Science render service to humanity ?

   (v) Bring out the difference between the Earth and the Sun. 10

3. Answer any **TWO** of the following questions :

   (i) What according to the mother, is the story of the origin of the Champak trees ?

   (ii) Summarise the poem 'To the Indian Who Died in Africa'.

   (iii) Describe the classroom as presented in the poem 'The Best of School'.

   (iv) Summarise the poem 'Ballad of the Landlord' by Langston Hughes. 10

4. Do as directed :

(i) Nobody should be deprived _____ education. (Use appropriate Preposition) 1

(ii) _____ University is a sacred place of learning. (Use appropriate Article) 1

(iii) It is raining. (Add a Question Tag) 1

(iv) She sang a song. (Rewrite by using Simple Present Tense) 1

(v) She is beautiful. (Make it Negative) 1

5. Write a report on any **ONE** :

(i) Seven days N.S.S. Camp organised in a village.

(ii) Women Empowerment Programme.

(iii) Blood Donation Camp. 5

6. Write a paragraph on any **ONE** of the following :

(i) 'Smoking is injurious to health'.

(ii) Significance of Pure Drinking Water.

(iii) Eradication of Corruption.

(iv) Excessive use of mobile phones. 5

Sitabai Arts, Commerce & Science College Akola
Prelim Exam
Session 2021-22
B.Sc. I (Sem II)
Subject: English

ime: Three hour

Marks : 80

(i) Where did Gangu find Gomti at last ?

(ii) As against the aboriginal cultures who are the people who destroyed the Earth ?

(iii) What is Kipling's final advice to his listeners ?

(iv) What are the principal factors for soil erosion ?

(v) Where was United Nations Conference on 'Freedom of information' held ? 5

2. Answer any **TWO** of the following in about **100** words each :

(i) Attempt a character sketch of Gangu.

(ii) How do the white people exploit nature and the earth ?

(iii) What, according to Kipling, is the main cause of the darkness in young people's lives ?

(iv) Why does C.V. Raman say that water is the true elixir of life ? 10

3. Answer any **TWO** of the following :

(i) What is the message conveyed in the poem "Say Not the Struggle Naught Availeth" ?

(ii) Show how the poet connects God and Nature in the poem 'God's Grandeur'.

(iii) Write summary of the poem 'Stay Calm'.

(iv) How does the bangle seller enhance the quality of life of simple people and bring joy and colour to it ? 10

4. Do as directed :

(i) Nobody should be deprived _____ education. (Use appropriate Preposition) 1

(ii) _____ University is a sacred place of learning. (Use appropriate Article) 1

(iii) It is raining. (Add a Question Tag) 1

(iv) She sang a song. (Rewrite by using Simple Present Tense) 1

(v) She is beautiful. (Make it Negative) 1

5. Write a report on any **ONE** :

(i) Seven days N.S.S. Camp organised in a village.

(ii) Women Empowerment Programme.

(iii) Blood Donation Camp. 5

6. Write a paragraph on any **ONE** of the following :

(i) 'Smoking is injurious to health'.

(ii) Significance of Pure Drinking Water.

(iii) Eradication of Corruption.

(iv) Excessive use of mobile phones. 5

SANT GADGE BABA AMRAVATI UNIVERSITY

Affiliated to The BGE Society's

Sitabai Arts, Commerce and Science College Akola.

Botany B.Sc.I Sem-II

Prelims Examination Session-2022

Time- 3 hrs Max.Marks-80.

Note- 1) There are 7questions.

2) Que.1 is compulsory and carry 8 marks.

3) que.2-6 carry equal marks.

4) Draw well labelled diagram wherever necessary.

Q.1 A) Fill in the Blanks. **2**

i)The plant which completes its life cycle within one year is called----

ii) The seed is a fertilized and ripened---

iii) The modification of root in carrot is----

vi)The function of pneumatophore root is—

B) Choose correct alternative (MCQ) **2**

v) Botanical name of Potato-

a) *S.tuberosum* b) *S. indicum* c) *S.nigrum* d) *S.xanthocarpum*.

vi) The *Pinus* belongs to order-

a) *Gnetales* b) Coniferales c) *Cycadales* d) None of these.

vii) When more than two leaves are present on a node, the phyllotaxy is called as—

a) Opposite decussate b) Whorled c) Alternate d) opposite superposed.

viii) Cyathium inflorescence found in family—

a) Euphorbiaceae b) papilionaceae. C) Solanaceae d)Verbenaceae.

C) Answer in One sentence. **4**

ix) Define inflorescence

x) What are fossils?

xi) What is Pappas?

xii) Functions of Root ?

Q.2 Comment on-

a) Impression. **4**

b) Kaloxylon hookeri. **4**

c) Process of fossilization. **4**

OR

p) Geological Time Scale.(Only table) **4**

q) *Lyginopteris oldhamia.* **4**

r)Compression. **4**

Q.3 Describe the male cone and male gametophyte in *Pinus*. **12**

OR

Explain the female cone and female gametophyte of *Gnetum*.

Q.4 Describe-

a) Raceme **4**

b) Bilabiate corolla. **4**

c) Axile placentation. **4**

OR

p) Cyathium. **4**

q) Cruciform corolla. **4**

r) Self-pollination. **4**

Q.5) Describe modification of aerial stem. **12**

OR

a) Describe reticulate venation of leaves. **6**

b) Describe modification of tap root for storage of food. **6**

Q.6 Describe morphology, varieties and economic importance of **cotton.** **12**

OR

a)Explain morphological types of simple dehiscent fruit. **6**

b)Describe varieties and economic importance of Potato. **6**

Q.7 Comment on-

a) Economic importance of *Cardamon*. **4**

b) Sources of timber. **4**

c) Medicinal significance of *Ocimum sanctum* **4**

OR

p) Economic importance of *Eucalyptus*. **4**

q) Uses of bamboo **4**

r) Medicinal uses of *Emblica officinalis*. **4**

SANT GADGE BABA AMRAVATI UNIVERSITY

Affiliated to The BGE Society's

Sitabai Arts, Commerce and Science College Akola.

Botany B.Sc.I Sem-II

Prelims Examination Session-2019

Time- 3 hrs Max.Marks-80.

Note- 1) There are 7questions.

2) Que.1 is compulsory and carry 8 marks.

3) que.2-6 carry equal marks.

4) Draw well labelled diagram wherever necessary.

Q.1 A) Fill in the Blanks. **2**

i) The root arising from other than the radicle is known as---

ii) The seed is a fertilized and ripened---

iii)A region of Autumn and spring wood form—

vi)The function of pneumatophore root is—

B) Choose correct alternative (MCQ) **2**

v) Cyathium inflorescence found in family—

a) Euphorbiaceae b) papilionaceae. C) Solanaceae d)Verbenaceae.

vi)Phyllode is a modification of---

a)Leaf blade b) Stipule c) Leaflet d) Petiole.

vii) Flower is condensed and modified—

a) Shoot b) Stem c) Leaf d) Inflorescence.

viii) Botanical name of Potato-

a) *S.tuberosum* b) *S. indicum* c) *S.nigrum* d) *S.xanthocarpum*.

C) Answer in One sentence. **4**

ix) Define epipetalous stamen?

x) What are fossils?

xi) What is Pappas?

xii) Define simple leaf.

Q.2 Comment on-

a) Compression. **4**

b) Structure of male flower in Bennettities. **4**

c) *Lyginopteris oldhamia.* **4**

OR

p) Impression. **4**

q) Structure of Ovuliferous receptacle in Bennettitis. **4**

r) Process of fossilization. **4**

Q.3 Draw well labelled diagram only.

a) L.S.of female cone in *Pinus*. 4

b) T.S.of needle in *Pinus*. 4

c) L.S.of ovule in *Gnetum*. 4

OR

p) T.S.of stem in *Pinus*. 4

q) Male cone in *Gnetum*. 4

r) Affinities of Gymnosperm with Angiosperms. 4

Q.4) Describe modification of aerial stem. 12

OR

a)Describe reticulate venation of leaves. 6

b) Describe modification of tap root for storage of food. 6

Q.5) Comment on-

a)Capitulum inflorescence. 4

b) Papilionaceous corolla. 4

c) Anemophilly. 4

OR

p)Monochasial cymose inflorescence. 4

q) Axile placentation. 4

r) Cohesion of Stamen. 4

Q.6 What is fruit? Describe morphological types of simple dry fruits. 12

OR

a) Describe varieties and economical importance of Ground nut. 6

b) Describe varieties and economical importance of Cotton. 6

Q.7.Comment on-

a) Economic importance of Clove. 4

b)Source of Bamboos. 4

c) Medicinal uses of *Azadirachta indica*. 4

OR

p) Economic importance of *Eucalyptus*. 4

q) Economic importance of *Cardamon*. 4

r) Medicinal uses of *Emblica officinalis*. 4

SANT GADGE BABA AMRAVATI UNIVERSITY

Affiliated to The BGE Society's

Sitabai Arts, Commerce and Science College Akola.

Botany B.Sc.I Sem-II

Prelims Examination Session-2018

Time- 3 hrs Max.Marks-80.

Note- 1) There are 7questions.

2) Que.1 is compulsory and carry 8 marks.

3) que.2-6 carry equal marks.

4) Draw well labelled diagram wherever necessary.

Q.1 A) Fill in the Blanks. **2**

i) The male reproductive structure of *Lyginopteris oldhamia* is called----

ii) *Gnetum* belongs to the order-----

iii) The plant which completes its life cycle within one year is called----

iv) The modification of root in carrot is---- **2**

B) Choose correct alternative (MCQ)

v) The *Pinus* belongs to order-

a) *Gnetales* b) Coniferales c) *Cycadales* d) None of these.

vi) Potato is modified-

a) Root b) Stem c) Leaf d) Fruit.

vii) When more than two leaves are present on a node, the phyllotaxy is called as—

a) Opposite decussate b) Whorled c) Alternate d) opposite superposed.

viii) Capitulum inflorescence is present in-

a) *Tridax* b) *Hibiscus* c) *Coriander* d) *Delonix.*

C) Answer in one sentence. **4**

ix) Functions of Root ?

x) Define inflorescence ?

xi) Which are accessory whorls of flower ?

xii) *Catharanthus roseus* belongs to which family ?

Q.2 Comment on:

a) Impression. **4**

b)Compression. **4**

c) *Kaloxylon hookeri.* **4**

OR

p) Process of fossilization. **4**

q) Fructification of Bennettities. **4**

r) Geological Time Scale.(Only table) **4**

Q.3 Describe the male cone and male gametophyte in *Pinus*. **12**

OR

Explain the female cone and female gametophyte of *Gnetum*.

Q4) Explain:

a) Reticulate venation. 4

b) Fusiform root. 4

c) Rhizome. **4**

OR

p) Pneumatophores. 4

q) Phylloclade. 4

r) Opposite phyllotaxy. 4

Q.5) Describe-

a) Raceme 4

b) Bilabiate corolla. 4

c) Axile placentation. **4**

OR

p) Cyathium. 4

q) Cruciform corolla. 4

r) Self-pollination. 4

Q.6 Describe morphology, varieties and economic importance of **cotton.** **12**

OR

a) Explain morphological types of simple dehiscent fruit. 6

b) Describe varieties and economic importance of Potato. **6**

Q.7 Comment on-

a) Economic importance of *Cinnamon.* **4**

b) Sources of timber. **4**

c) Medicinal significance of *Ocimum sanctum.* **4**

OR

p) Economic importance of *Clove.* **4**

q) Sources of Firewood. **4**

r) Medicinal uses of *Azadircahta indica.* **4**

SANT GADGE BABA AMRAVATI UNIVERSITY

Affiliated to The BGE Society's

Sitabai Arts, Commerce and Science College Akola.

Botany B.Sc.II Sem-IV

Prelims Examination Session-2022

Time- 3 hrs Max.Marks-80.

Note- 1) There are 7questions.

2) Que.1 is compulsory and carry 8 marks.

3) que.2-6 carry equal marks.

4) Draw well labelled diagram wherever necessary.

Q.1 A) Fill in the Blanks. **2**

i) Somatic cell division is called ----

ii) When one gene suppress the activity of other gene called as—

iii) --------is power house of the cell.

vi)The F2 generation ration of supplementary genes is----

B) Choice correct alternative (MCQ) **2**

v) Mendel conducted his hybridization experiments on---

a)Cotton b) Garden Pea Plant c) Allium cepa d) Ground nut.

vi) Exchange chromosome segment is called----

a)Gene mutation b) Segregation c) Crossing over d) Dominance.

vii) Extra nuclear DNA is found in---

a)Vacuoles b) Ribosomes c) Chloroplast d) Golgi bodies.

viii) F1 particles are found in---

a)Chloroplast b) Ribosomes c)Plasma membrane d) Mitochondria.

C) Answer in One sentence. **4**

ix) What are enzymes?

x) Define polyploidy?

xi) What is induced mutation?

xii) What is independent assortment?

Q.2) Explain

a) Structure of cell wall. **4**

b) Function of chloroplast. **4**

c) Nucleolus. **4**

OR

p) Structure of nuclear membrane. **4**

q) Function of plasma membrane. **4**

r) Eukaryotic cell. **4**

Q.3 Explain the following-

a) Function of chromosomes. 4

b) Peroxisomes. 4

c) Structure of Golgi complex. 4

OR

p) Pachytene. 4

q) Function of mitochondria. 4

r) Structure of Endoplasmic reticulum. 4

Q.4 Describe-

a) Duplication. 4

b) Morphology of chromosome. 4

c) Allopolyploidy. 4

OR

p) Auto polyploidy. 4

q) Deletion. 4

r) Trisomy. 4

Q.5 Describe-

a) Supplementary factor. 6

b) Law of independent assortment. 6

OR

In Jawar genes P and Q interact to produce glume colours. Dominant genes P and Q together produce reddish pink colour.Gene P alone produce blackism pink colour. The own effect of Q is not seen if p is absent,therefore pQ and Pq produce brown colour.

Determine the proportions of offspring with to glume colour in the following crosses. 12

i) Ppqq x Ppqq

ii) ppQQ x PpQq

iii) PPQq x PpQq

iv) Ppqq x ppQq

Q.6) Explain-

a) Chromosome theory of linkage. 4

b) Significance of crossing over. 4

c) Physical mutagens. 4

OR

p) Chloroplast DNA. 4

q) Induced mutation. 4

r) l=Linkage theory. 4

Q.7 Structure and functions of carbohydrates. 12

OR

a) Explain general characteristic of enzymes. 4

b) Explain mechanism of action of enzyme. 4

c) Lock and key model. 4

SANT GADGE BABA AMRAVATI UNIVERSITY

Affiliated to The BGE Society's

Sitabai Arts, Commerce and Science College Akola.

Botany B.Sc.II Sem-IV

Prelims Examination Session-2019

Time- 3 hrs Max.Marks-80.

Note- 1) There are 7questions.

2) Que.1 is compulsory and carry 8 marks.

3) que.2-6 carry equal marks.

4) Draw well labelled diagram wherever necessary.

Q.1 A) Fill in the Blanks. **2**

i) Father of Genetics is---
ii) The power house of the cell-----
iii) Homo sapiens has----------pair of chromosomes.
iv)The F2 ration of complementary gene is----

B) Choose the correct alternative MCQ. **2**

v) Haploid set of chromosome is called as-

a) Individual b) Genome c) Nucleolus d) Gene.

vi) Simplest monosaccharide made up of six carbon atoms amongst the following is-

a)Erythrose b) Glucose c) Ribose d) Glyceraldehyde.

vii) Monosomic are-

a)2n+1 b)2n-1 c) 2n+2 d) 2n-2.

viii) Chromosomes are best seen in-

a) Interphase b) Prophase c) Metaphase d) Telophase.

C) Answer in One sentence- **4**

ix) What is the monohybrid cross?
x) What is mutation?
Xi) What is synapsis?
xii) Define a cell.

2. Explain the following

a) Structure of chloroplast **4**
b) Fluid mosaic model of plasma membrane. **4**
c) Nucleolus. **4**

OR

p) Prokaryotic cell **4**
q) Function of chloroplast. **4**
r) Structure and function of cell wall. **4**

Q.3 Comment on-

a) Structure of endoplasmic reticulum. 4
b) Function of Golgi complex 4
c) Structure of Mitochondria. 4

OR

p) Significance of Mitosis. 4
q) Structure of Ribosome 4
r) Peroxisomes. 4

Q.4. Explain the following-

a) Morphology and structure of chromosome. 4
b) Duplication. 4
c) Allopolyploidy. 4

OR

p) Inversion 4
q) Monosomy and Nullisomy 4
r) Translocation. 4

Q.5 Comment on-

a) Law of Independent assortment. 4
b) Epistasis. 4

OR

In several pea, the genes C and P when come toghther produce purple flower but when either C and P is Present alone, it produces white flowers. What flower colours and their proportions will be produced in the following crosses. 12

i) CCPp x ccPp
ii) CcPp x ccPP
iii) Ccpp x CCpp.
iv) ccPP x CCpp.

Q.6 Explain the following

a) Induced mutation. 4
b) Coupling and repulsion theory of linkage. 4
c) Copy Choice Theory of Crossing Over. 4

OR

p) Mitochondrial DNA. 4
q) Significance of Crossing over. 4
r) Types of Linkages. 4

Q.7 what are enzymes? Give Nomenclature of enzymes with suitable example 12

OR

Explain:

a) Structures and functions of Disaccharides. 6
b) Concept of holoenzymes, co-enzyme and cofactors. 6

SANT GADGE BABA AMRAVATI UNIVERSITY

Affiliated to The BGE Society's

Sitabai Arts, Commerce and Science College Akola.

Botany B.Sc.II Sem-IV

Preliminary Examination Session-2018

Time- 3 hrs Max.Marks-80.

Note- 1) There are 7questions.

2) Que.1 is compulsory and carry 8 marks.

3) que.2-6 carry equal marks.

4) Draw well labelled diagram wherever necessary.

Q.1 A) Fill in the Blanks. 2

i) Chromosome without centromere is called as--------chromosome.
ii) The F2 ratio of complementary factor is----------
iii) Starch is a type of ----------carbohydrates.
iv) In Allium cepa (Onion) no. of chromosomes are----------

B) Choose correct alternative (MCQ): 2

v) Mendel was born in-

a) Austria b) U.K. c) Australia. d) France.

vi) Law of independent assortment is related to-

a)monohybrid ration b) linkage c) dihybrid ration d) crossing over.

vii) Reduction division takes place in-

a)Mitosis b) Amitosis c) Meiosis d) Fragmentation.

Viii) Glucose is a type of carbohydrate-

a) Monosaccharide b) Disaccharide c) Polysaccharide d) trisaccharide.

C) Answer in one sentence: 4

ix) What is dihybrid cross?
x) What are extra nuclear genomes?
xi) What is coenzyme?
xii) What is mutation?

Q.2) Explain:

a) Function of nucleus. 4
b) Structure of chloroplast. 4
c) Fluid-mosaic model of plasma membrane. 4

OR

p) Prokaryotic cell. 4
q) Structure of Nuclepore complex 4
r) Function of cell wall. 4

Q.3) Describe:

a) Structure and function of endoplasmic reticulum. **4**
b) Structure of ribosomes. **4**
c) Metaphase of mitosis **4**

OR

p) Structure of Golgi complex. **4**
q) Structure of mitochondria **4**
r) Leptotene. **4**

Q.4) Explain the following:

a) Deletion and Translocations. **6**
b) Morphology and structure of chromosome. **6**

OR

p) Euploidy **6**
q) Duplication and inversion. **6**

Q.5) Give an account of:

a) Supplementary factor. **6**
b) Mendel's law of segregations and independent assortment. **6**

OR

In Sorghum, whitw midrib "D" is dominant over dull-green midrib "d" and pearly "A" is dominant over chalky grain "a" what are the phenotypes and genotypes of F1 and F2 generations. **12**

Q.6) Explain:

a) Mitochondrial DNA. **4**
b) Complete linkage. **4**
c) Spontaneous mutation. **4**

OR

p) Copy-choice theory of crossing over. **4**
q) Types of linkages. **4**
r) Chemical mutagens. **4**

Q.7) Explain:

a) Structure of monosaccharaides. **4**
b) Concept of holoenzymes. **4**
c) Nomenclature of enzyme. **4**

OR

p) Co-enzyme and co-factors. **4**
q) Structure and functions of polysaccharides. **4**
r) Characteristic of enzymes **4**

Sant Gadge Baba Amravati Universiry
The B.G.E Society's
Sitabai Arts, Commerce & Science College Akola
Department of Botany
B.Sc.III (sem-VI) 2021-22

Time : Three hour | Max Marks : 80

Note : (I)There are seven questions in a!l.
(2) Q. 1 is compulsory and carries 8 marks.
(3) Q. 2 to Q. 7 carry equal marks.
(4) Draw neat and well label led diagrams if necessary.

1. (A) Fill in the blanks :

(i) "The backbone of DNA is made up o1'_____bonds. ½

(ii) The organele involved in Protein synthesis is _____ ½

(iii) I.ac Z gene of Lac operon encodes_____enzyme. ½

(iv) GP4O 3tands for _____

(B) Choose the correct alternative (fiICQ) :

(i) 1'hagc IONA used by IJershcy and Chase is radio labelled with ½

(a) 'S (b) "P
(c) "'CO (d) ^{3}H

(ii) Genc as a unit of iiiutati n tern.s as ½

(at Recon (b) Lluton
(c) C istron (d) Nuclet›tide

(iii) (gene Battcry' Model is s= en by ½

(a) Jacob and bonad (b) Crick
(c) Britton and Dai'idson (d) E:mil Fischer

(iv) Ivor ascptic transtcr of explant on nutricnt Incdiunl ntGds : ½

(a) Incubaator (b) Centrifuge
(c) Oven (d) I.aminar Air

(C) Write answer in one sentence e:ich

(i) I9etine plasmid. 1

(ii) Give the site of' proicin si nthesis in ihe cytoplasm. 1

(iii) which is initiiit ion codon ? 1

(iv) w'hat is Protoplast ? 1

2. Explain
a) Griffth experiment
b) / Ac/ds system
C) Hunf lcosorne

(a) Chemical composition o f DNA. 4

(b) Replication fork. 4

(c) Satellite DNA, 4

3. Describe the different topics of RNA. 12

OR

Describe transcriptican and m-RNA processing in Eukaryotes. 12

4. Describc opcron concept with special reference to Lac Operon. 12

OR

Describe Primary. Secondary, Tertiary and Quaternary structures of proieins. 12

5. Explain

(g) Ti plasmid. 4

(h) Genomic DNA L ibrary. 4

(i) Restriction endonuc lcascs. 4

OR

(j) ligages as cloning vector. 4

(k) cDNA Library 4

(1) FCR. 4

6. Explain

(m) Autoc1ave. 4

(n) 1(icropropa ation 4

(o) Role of litinnones in tissue culture. 4

OR

(p) Laminas Air fixw'. 4

(q) Totipotency. 4

(r) Callus culture. 4

7. Describ• in brief :

(s) BT--cotton. 4

(t) Edible vaccines. 4

(u) Protoplast culture. 4

OR

(v) Somatic hybridizatiton, 4

(w) Alcohol production by fermenlation. 4

(x) Synthetic seeds. 4

SANT GADGEBABA AMRAVATI UNIVERSITY, AMRAVATI
THE BERAR GENERAL EDUCATION SOCIETY
SITABAI ARTS,COMMERCE AND SCIENCE COLLEGE,AKOLA

PRELIMINARY EXAM : 2019

B.Sc. lll,Semister Vl Botany

Time : Three Hours] [Maximum Marks : 80

Note :— (1) There are **seven** questions in all.
(2) Q. **1** is compulsory and carries **8** marks.
(3) Q. 2 to Q. 7 carry equal marks.
(4) Draw neat and well labelled diagrams wherever necessary.

(A) Fill in the blanks :
(i) The backbone of DNA is made up of _____ Bonds. ½
(ii) The organelle involved in Protein synthesis is _____. ½
(iii) Lac Z gene of Lac operon encodes _____ enzyme. ½
(iv) GMO stands for _____. ½

(B) Choose the correct alternative (MCQ) :
(i) Phage DNA used by Hershey and Chase is radio labelled with : ½
(a) ^{35}S (b) ^{32}P
(c) ^{60}CO (d) ^{3}H
(ii) Gene as a unit of mutation terms as : ½
(a) Recon (b) Muton
(c) Cistron (d) Nucleotide
(iii) Gene Battery Model is given by : ½
(a) Jacob and Monad (b) Crick
(c) Britton and Davidson (d) Emil Fischer
(iv) For aseptic transfer of explant on nutrient medium needs : ½
(a) Incubator (b) Centrifuge
(c) Oven (d) Laminar Air flow

(C) Write answer in **one** sentence each :
(i) Define plasmid. 1
(ii) Give the site of protein synthesis in the cytoplasm. 1
(iii) Which is initiation codon ? 1
(iv) What is Protoplast ? 1

2. Explain :
(a) Griffin's experiment. 4
(b) Ac-Ds system. 4
(c) Nucleosome model. 4

OR

(d) Chemical composition of DNA. 4

(e) Replication fork. 4

(f) Satellite DNA. 4

3. Describe the different types of RNA. 12

OR

Describe transcription and m-RNA processing in Eukaryotes. 12

4. Describe operon concept with special reference to Lac Operon. 12

OR

Describe Primary, Secondary, Tertiary and Quaternary structures of proteins. 12

5. Explain :

(g) Ti plasmid.

(h) Genomic DNA Library. 4

(i) Restriction endonucleases. 4

OR

(j) Phages as cloning vector. 4

(k) cDNA Library. 4

(l) PCR. 4

6. Explain :

(m) Autoclave. 4

(n) Micropropagation 4

(o) Role of hormones in Tissue culture. 4

OR

(p) Laminar Air flow. 4

(q) Totipotency. 4

(r) Callus culture. 4

7. Describe in brief :

(s) BT-cotton. 4

(t) Edible vaccines. 4

(u) Protoplast culture. 4

OR

(v) Somatic hybridization. 4

(w) Alcohol production by fermentation. 4

(x) Synthetic seeds. 4

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Sitabai Arts, Commerce & Science College, Akola

Affiliated to Saint Gadge Baba Amravati University, Amravati (M/S)

Subject - Mathematics

B.Sc. Part 1 (Sem-II) Paper – III (Vector Analysis & Solid Geometry)

Preliminary Examination [Year-2019]

Time:Three Hours] **[Maximum Marks : 60**

Note: (1) Question No. 1 is compulsory **(2) Solve ONE question from each unit.**

Q1. Choose the correct alternative in the following: **1 mark each**

(i) The cross product of any two non-zero vectors is a_____

(a) Scalar (b) Vector (c) Both Scalar and Vector (d) None of these

ii) Two non-zero vectors **a** and **b** are parallel iff_____

(a) **a. b**=0 (b) **a** x **b**=0 (c) **a.b = b.a** (d) **a×b = b×a**

iii) The equation of osculating plane is_____

(a) (R- r). **t**=0 (b) (R-r). **b**=0 (c) (R - r).**n** = 0 (d) none of these

(iv) A line perpendicular to both **t** and **n** is called_____

(a) tanget line (b) binormal line (c) principal normal line (d) none of these

(v) A vector **f** is solenoidal if_____

(a) div **f** = 0 (b) curl **f** = 0 (c) div **f** ≠0 (d) curl **f**≠ 0

(vi) If $\mathbf{r} = x_i + y_j + z_k$ then div **r** is equal to _____'

(a) Zero (b) One (c) Two (d) Three

(vii) A plane section of a sphere is a _____

(a) Sphere (b) Circle (c) Both Sphere and Circle (d) None of these

(viii) The equation $x^2 + y^1 + 2ux + 2vy + 2wz + d = 0$ represents a real sphere if_____

(a) $u^2+v^2+w^2 = d$ (b) $u^2+v^2+w^2 > d$ (c) $u^z+v^2+w^2 < 0$ (d) $u^2+v^2+w^2=0$

(ix) In right Circular Cylinder, the radius of the circle is the radius of the_____

(a) Circle (b) Sphere (c) Cylinder (d) Cone

(x) Every section of a right circular cone by a plane perpendicular to its axis is a _____

(a) Plane (b) Circle (c) Sphere (d) Cone

UNIT-I

(a) Prove that a necessary and suf[icient condition that $\mathbf{a}\times(\boldsymbol{b}\times\boldsymbol{c})=(\mathbf{a}\times\mathbf{b})\times\boldsymbol{c}$ is $(\boldsymbol{a}\times\boldsymbol{c})\times\boldsymbol{b}=\mathbf{0}$ 4

(b) If f and g are functions of x, y, z then prove that $\frac{\partial}{\partial x}(\mathbf{f}.\mathbf{g})=\mathbf{f}.\frac{\partial g}{\partial x}+\mathbf{g}.\frac{\partial f}{\partial x}$ 3

(c) If $\mathbf{r}(t)=5t^2\mathbf{i}+t\mathbf{j}-t^3\mathbf{k}$. Then prove that $\int_1^2 \boldsymbol{r}\times\frac{d^2r}{dt^2}dt=-14\mathbf{i}+75\mathbf{j}-15\mathbf{k}$ 3

Q3. (p) If $\mathbf{a}=a_1\mathbf{i}+a_2\mathbf{j}+a_3\mathbf{k}$. $\mathbf{b}=b_1\mathbf{i}+b_2\mathbf{j}+b_3\mathbf{k}$. $\mathbf{c}=c_1\mathbf{i}+c_2\mathbf{j}+c_3\mathbf{k}$. Then prove that

$\mathbf{a}.(\mathbf{b}\times\mathbf{c})=\mathbf{b}.(\mathbf{c}\times\boldsymbol{a})=\mathbf{c}.(\mathbf{a}\times\mathbf{b})$ 4

(q) If $\mathbf{f}=2t^2\mathbf{i}-t\mathbf{j}+z\mathbf{k}$. $G=7\mathbf{i}+t^2\mathbf{j}-t\mathbf{k}$. Then find $\frac{d}{dt}$ (fxg). 3

(r)Prove that $(\mathbf{axb})\times(\mathbf{axc}).\mathbf{d}=(\mathbf{a}.\mathbf{d})[\mathbf{a}\ \mathbf{b}\ \mathbf{c}]$ 3

UNIT II

Q4 a) Show that the Serret-Frenel formulae at a point can be written in the form

$\mathbf{t}'=\mathbf{d}\times\boldsymbol{t}$ $\mathbf{n}'=\mathbf{d}\times\mathbf{n}$, $\mathbf{b}'=\mathbf{d}\times\mathbf{b}$ where $\mathbf{d}=\tau\mathbf{t}+k\mathbf{b}$ is a Darboux's vector. 5

b) Prove that helices are the only twisted curves whose Darboux's vector has a constant direrion. 5

Q5 p) State and prove Serret-Frenel formulae. 4

q) Find the equations of the tangent to the curve x = 3t, y:3t2, z:2t3 at the point t = l. 3

r) Find the curvature and torsion of the circularhelix $x=a\cos\theta, y=a\sin\theta. z=c\theta$ at any point. 3

UNIT III

Q6 (a) $\mathbf{F}=(3x^2+6y)\mathbf{i}-14yzj+20xz^z\mathbf{k}$, then evaluate $\int_c \boldsymbol{F}\boldsymbol{d}\boldsymbol{r}$ from(0, 0, 0) to (1, 1. 1) along the path $x=t, y=t^2, z=t^3$. 4

b)If $\mathbf{r}=x\mathbf{i}+y\mathbf{j}+z\mathbf{k}$ then find:

(i) grad $|\boldsymbol{r}|$

(ii) div. $\mathbf{r}$

(iii) curl $\mathbf{r}$. 2+2+2

Q7 p) Verily Green's theorem in thc plane for $\int_c (xy+y^2)dx+x^2dy$, where C is the closed curve of the region bounded by y: x and $y=x^2$. 4

q) If $\mathbf{f}=x^2zi-2y^3z^2j+xy^2z$ then find div $\mathbf{f}$ and curl $\mathbf{f}$ at (1,-1, 1) . 3

r) Find the work done in moving a particle once around a circle C in the xy plane of radius

2 and centre (0, 0) and if the force field is given by $f = 3xy\mathbf{i} - y\mathbf{j} + 2zx\mathbf{k}$. 3

UNIT-IV

Q8 a) Two spheres of radii r_1 and r_2 cut orthogonally. Prove that the radius of thc common circle is $\frac{r_1 r_2}{\sqrt{r_1^2+r_2^2}}$ 5

b) Find the equation to the sphere which passes through the points (0,0, 0), (0, 1, -1), (-1, 2, 0) and (1, 2, 3). 5

Q9 p) Show that the spheres:

$x^z + y^2 + z^2 + 2x - 6y - 14z + 1 = 0$ and

$x^2 + y^t + 2^2 - 4x - 8y + 2z + 5 = 0$ are orthogonal. 5

q) Find the equation of the sphere through the circle $x^2 + y^2 + z^2 = 9$, $2x + 3y + 4z = 5$ and. The point (1,2, 3). 5

UNIT V

Q10 a) Find the equation of right circular cylinder which passes through the circle $x^2+y^2+z^2 = 9$, $x - y + z = 3$. 5

b) Find the equation of the right circular cylinder of radius 2 and whose axis is the line $\frac{x-1}{2} = \frac{y}{3} = \frac{z-3}{1}$ 5

Q11 p) Prove that the equation of a cone with vertex at the origin is homogeneous. 5

q) Find the equation of the cone whose vertex is at the point $(\alpha, \beta,$ y) and whose generators touch the sphere $x^2 + y^2 + z^2 = a^2$ 5

The B.G.E. Society's

Sitabai Arts, Commerce & Science College, Akola

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Subject - Mathematics

B.Sc. Part 1 (Sem-II) Paper – IV Differential Equation: Ordinary & Partial

Preliminary Examination [Year-2019]

Time:Three Hours] **[Maximum Marks : 60**

Note: (1) Question No. 1 is compulsory **(2) Solve ONE question from each unit.**

Q1. Choose the correct alternative in the following: **1 mark each**

(i) The order of the D.E. : $(\frac{d^3x}{dx^3})^4 - (\frac{dy}{dx})^3 - y=0$ is----------

(a)1 (b) 2 (c) 3 (d) 4

(ii) The particular solution of the D.E. $y'' + Py' + Qy = 0$ is $y = e^x$ if: ----------

(a) P+xQ=o (b) 1+P+Q=o (c) 1- P+ Q=o (d) $m^2 + Pm + Q = 0$

(iii) The roots of the auxiliary equations of the D.E. $y'' - 5y' + 6y = 0$ are

(a) Real and equal (b) Complex (c) Real and distance (d) None of these

(iv) The D.E. $Mdx + Ndy = 0$ is exact if:

(a) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial x}$ (b) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial y}$ (c) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ (d) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

(v)The inlegrating factor of the D.E. $\frac{dy}{dx} - xy = x^2$

(al $e^{\frac{-x^2}{2}}$ (b) $e^{\frac{x^2}{2}}$ (c) e^x (d) e^{-x}

(vi) The PI of $f(D)y = e^{ax}$ is given by : ----------

(a) $\frac{1}{f(D+a)} e^x$ (b) $\frac{1}{f(a)} e^x : f(a) \neq 0$ (c) $\frac{1}{f(D-a)} e^{ax}$ (d) $\frac{1}{f(a)} e^{ax} : f(a) \neq 0$

(vii) Lagranges form of the PDE of order one is: ----------

(a) Pp+Qq=R (b) Pq – Qp= R (c) Pq+Qp=R (d) none of these

(viii) The solution of PDE $z = a^2t$ is:----------

(a) $z = F_1(y+ ax) + F_2(y- ax)$ (b) $z = F_1(y- ax) + F_2(y- ax)$ (c) z=f(y+ax) (d) none of these

(ix) The general solution of thc PDE $F(D, D')z = 0$ is consist of

(a) C.F. only (b)P.I. only (c) C.F. and P.I. both (d) none of these

(x) The P.I. of the PDE $(2D - 3D')z = e^{x-y}$ is :----------

(a)$\frac{1}{5} e^{x-y}$ (b) $-\frac{1}{5} e^{x-y}$ (c) e^{x-y} (d) $-e^{x-y}$

UNIT-I

Q2. (a) Solve the D.E $xy\frac{dy}{dx}=y^3e^{x^2}$ 5

(b) Show that D.E. : $(e^x + 1)\cos x dx + e^y \sin y\, dy = 0$ is exact and hencc solve it. 5

Q3. (p) find the D.E. satisfied by the system of parabolas $y2=4a(x+a)$:

and show that the orthogonal trajcctodcs of the system belong to the system itself. 5

(q) Solve the D.E. $(p - xy)(p - x^2)(p - y^2) = 0$. 5

UNIT-II

Q4. (a) Solve the D.E. $y'' - 4y' + 4y = e^{2x} + \sin 2x$. 5

(b) Solve the D.E. $(x^2D^2 + 3xD + 5)y = x^2 \sin(\log x)$. 5

Q5. (p) Solve the D.E. $y'' + 3y' + 2y = e^{5x}$. 5

(q) Solve the D.E. $y'' + 2y' + 2y = x$? 5

UNIT-III

Q 6. (a) Solve the D.E. $y'' - y = \frac{2}{1+e^x}$ by the method of variation of parameters. 5

(b) Solve the simultaneous DE $\frac{dx}{dt} - 2\frac{dy}{dt} - 2x + 2y = 3e^t$; $3\frac{dx}{dt} + \frac{dy}{dt} + 2x + y = 3e^{2t}$ 5

Q 7 (p) Solve the D.E. by changing the independent variable $x^6y'' + 3x^5y' + a^2y = \frac{1}{x^2}$. 5

(q) Solve the D.E. by reducing it to normal form $y'' - 2xy' + (x^2 + 2)y = e^{\frac{x^2+2x}{2}}$ 5

UNIT-IV

Q 8 (a) Solve the PDE $x(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$. 5

(b) Solve the PDE $p^2 + q^2 = x^2 + y^2$. 5

Q 9 (p) Solve : $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$. 5

(q) Solve the PDE $z^2(1 + p^2 + q^2) = k^2$. 5

UNIT-V

Q 10 (a) Apply Charpit's method to solve $z^2 = pqxy$. 5

(b) Solve PDE $r - 3s + 2t = e^{2x+3y} + \sin(x - 2y)$. 5

Q 11 (p) Solve the PDE $D(D - 2D' - 3)z = e^{x+2y}$. 5

(q) Solve the PDE $r + s - 6t = y \cos x$. 5

The B.G.E.Societies

Sitabai Arts, Commerce & Science College Akola

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B.Sc II, Sem IV, Mathematics Paper: VII (Modern Algebra)

Preliminary Exam

Session 2018-2019

Time : Three Hours] [Maximum Marks : 60

Note :— (1) Question No. **1** is compulsory and attempt it once only.

(2) Solve **ONE** question from each unit.

1. Choose the correct alternative (1 mark each) : 10

(i) A group having only improper normal subgroup is called _____.

(a) a finite group (b) a permutation group

(c) a simple group (d) None of these

(ii) Every subgroup of a cyclic group is _____.

(a) non abelian (b) cyclic

(c) cyclic but not abelian (d) abelian but not cyclic

(iii) The identity permutation is _____.

(a) even (b) odd

(c) even and odd (d) even or odd

(iv) Let G be a group. Then $(ab)^{-1}$ is equal to _____.

(a) $a^{-1}b^{-1}$ (b) $b^{-1}a^{-1}$

(c) $(ba)^{-1}$ (d) None of these

(v) A homomorphism of a group into itself is _____.

(a) a homomorphism (b) an isomorphism

(c) an endomorphism (d) None of these

(vi) An integral domain has at least _____.

(a) One element (b) Two element

(c) Three element (d) None of these

(vii) If in a ring R, $x^2 = x \ \forall \ x \in R$, then R is _____.

(a) Commutative ring (b) Division ring

(c) Boolean ring (d) Ring with unity

(viii) A field which contains no proper subfield is called _____.

(a) Sub field (b) Prime field

(c) Integral domain (d) Division ring

(ix) The intersection of two left ideals of a ring R is _____.

(a) left ideal of R (b) right ideal of R

(c) both (a) and (b) (d) None of these

(x) The characteristic of an integral domain is :

(a) even number (b) odd number

(c) prime number (d) None of these .

UNIT–I

2. (a) Prove that the set $G = \{1, W, W^2\}$ is a group w.r.t. multiplication. 4

   (b) Prove that every subgroup of a cyclic group is cyclic. 4

   (c) If $f = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$ and $g = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix}$ then prove that $f.g \neq g.f$. 2

3. (p) Let G be a group. Prove that a non-empty subset H of G is a subgroup of G iff $a, b \in H \Rightarrow a.b^{-1} \in H$. 4

   (q) Find whether the following permutations are even or odd : 4

   (i) $f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 1 & 5 & 2 & 4 \end{pmatrix}$

   (ii) $g = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 6 & 4 & 1 & 5 & 2 \end{pmatrix}$

   (r) Define : 2

   (i) Cyclic group

   (ii) Order of an element of a group.

UNIT–II

4. (a) If H is a subgroup of a group G, then prove that any two right (left) cosets of H in G are either identical or disjoint. 5

   (b) Prove that N is a normal subgroup of G if and only if $gNg^{-1} = N \ \forall \ g \in G$. 5

5. (p) Show that if G is abelian, then the quotient group G/N is also abelian. 3

   (q) Let H be a subgroup of G and $N(H) = \{g \in G \mid gHg^{-1} = H\}$. Show that H is normal in G iff $N(H) = G$. 4

   (r) Prove that the intersection of two normal subgroups of a group is a normal subgroup of G. 3

UNIT–III

6. (a) If ϕ is a homomorphism of G into G' with Kernel K, then prove that K is a normal subgroup of G. 4

   (b) If ϕ is homomorphism of a group G into a group G', then prove that :

   (i) $\phi(e) = e'$ and

   (ii) $\phi(x^{-1}) = (\phi(x))^{-1} \ \forall \ x \in G$

   where e and e' are identities of G and G' respectively. 3

   (c) Let G be a group of real numbers under addition and $\phi : G \to G$ such that $\phi(x) = 13x \ \forall \ x \in G$, then prove that ϕ is homomorphism. 3

7. (p) If ϕ is homomorphism of G onto G' with Kernel K, then prove that $G/K \approx G'$. 5

   (q) Define :

   (i) Homomorphism

   (ii) Kernel of homomorphism.

   Prove that any Kernel is non-empty. 2+3

UNIT–IV

8. (a) Prove that the intersection of any family of subrings of a ring R is a sub ring of R. 3

   (b) If in a ring R, $x^3 = x \ \forall \ x \in R$, then show that R is commutative. 4

   (c) Let the characteristic of the ring R be 2 and let $ab = ba \ \forall \ a, b \in R$ then show that $(a + b)^2 = a^2 + b^2$. 3

9. (p) Prove that Prime field of characteristic zero is isomorphic to the field Q of rational numbers. 5

   (q) Let R be a ring with a unit element, 1, in which $(ab)^2 = a^2b^2 \ \forall \ a, b \in R$. Then prove that R is commutative. 5

UNIT–V

10. (a) If U is an ideal of a ring R with unity 1 and $1 \in U$, then prove that U = R. 2

    (b) If R is a commutative ring with a unit element and M is an ideal of R, then prove that M is a Maximal ideal of R iff R|M is a field. 5

    (c) Let R be a commutative ring with unity. Then prove that every maximal ideal of R is a prime ideal. 3

11. (p) If U is an ideal of ring R, then prove that R|U is a homomorphic image of R. 4

    (q) Let M be the ring of matrices of order 2 over the field R of real numbers and $U = \left\{ \begin{bmatrix} a & b \\ 0 & 0 \end{bmatrix} | a, b \in R \right\}$. Prove that U is a right ideal of M but U is not left ideal. 3

    (r) Let $U = \{19n \mid n \in z\}$ be an ideal of the ring of integers Z and V be an ideal of Z with $U \subset V \subset Z$. Then prove that V = U or V = Z. 3

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Subject - Mathematics

B.Sc. Part 2 (Sem-IV) Paper – VIII (Classical Mechenics)

Preliminary Examination [Year-2019]

Time: Three Hours] **[Maximum Marks : 60**

Note: (1) Question No. 1 is compulsory and attempt it at once only.

(2) Solve ONE question from each unit.

1. Choose the correct alternative (1 mark each) : 10

(i) For an inverse square law, the virial theorem reduces to _____.

(a) $2\overline{T} = -n\overline{V}$ (b) $2\overline{T} = n\overline{V}$

(c) $2\overline{T} = \overline{V}$ (d) $2\overline{T} = -\overline{V}$

(ii) The shortest distance between two points in space is _____.

(a) A straight line (b) An ellipse

(c) A parabola (d) A circle

(iii) A bead sliding along the wire. The constraint is _____.

(a) Holonomic (b) Non-holonomic

(c) Superfluous (d) None of these

(iv) The square of the periodic time of the planet is proportional to the _____ of the major axis of its orbit.

(a) Square (b) Cube

(c) Not both (a) and (b) (d) None of these

(v) A variable quantity whose value is determined by one or more than one function is called _____.

(a) An extremum (b) A point of inflection

(c) A functional (d) None of these

(vi) The founder of the calculus of variations is _____.

(a) Lagrange (b) Leibnitz

(c) J. Bernoulli (d) Euler

(vii) If q_i is cyclic, then $\frac{\partial H}{\partial q_i}$ = _____.

(a) 1 (b) -1

(c) 0 (d) None of these

(viii) For a single particle system, the least action principle yield _____.

(a) $\Delta\int\sqrt{2m(H-V)}\,ds=0$ (b) $\Delta\int\sqrt{2m(H+V)}\,ds=0$

(c) $\Delta\int\sqrt{m(H-V)}\,ds=0$ (d) None of these

(ix) A finite rotation can not be represented by _____.

(a) Double vector (b) Triple vector

(c) A single vector (d) None of these

(x) Infinitesimal rotation holds _____.

(a) Commutativity (b) Not Commutativity

(c) Distributivity (d) None of these

UNIT—I

2. (a) Prove virtual work on a mechanical system (for which the net virtual work of the forces of constraint vanishes) by the applied forces and the reversed effective forces is zero. 5

(b) Derive the Lagrange's equation of motion in the form $\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}_i}\right)-\frac{\partial L}{\partial q_i}=Q_i'$ for a system which is partly conservative. 5

3. (p) Discuss the motion of a particle in a plane by using polar coordinates. 5

(q) If L is a Lagrangian for a system of 'n' degree of freedom satisfying Lagrange's equations, show by direct substitution that $L'=L+\frac{dF}{dt}$, $F=F(q_1,\ldots..q_n t)$ also satisfies Lagrange's equations where F is any arbitrary but differentiable function of its argument. 5

UNIT—II

4. (a) Prove for a central force field F, the path of a particle of mass m is given by

$$\frac{d^2u}{d\theta^2}+u=-\frac{m}{h^2u^2}F\left(\frac{1}{u}\right),\ u=\frac{1}{r}.$$ 5

(b) Prove that for a particle moving under a central force such that $V = kr^{n+1}$, the virial theorem reduces to $2\bar{T}=(n+1)\bar{V}$. 5

5. (p) Prove the following relations :

(i) $t=\int_{r_0}^{r}\frac{dr}{f}$

(ii) $\phi=\phi_0+\left(\frac{h}{m}\right)\int_0^t\frac{dt}{r^2}$. 3+3

(q) Prove that in a central force field, the areal velocity is conserved. 4

UNIT—III

6. (a) Find the extremals of the functional :

$$I[y(x)] = \int_0^{\log 2} (e^{-x}y'^2 - e^{x}y^2)\,dx .$$ 5

(b) Find the shortest curve joining the points (x_1, y_1) and (x_2, y_2) in a plane. 5

7. (p) Define the n^{th} order distance. Find the second order distance between the curves $y = -\cos x$ and $y_1 = x$ on $[0, \pi/3]$. 1+4

(q) Prove that the functional $I[y(x)] = \int_{x_1}^{x_2} F(x, y, y')\,dx$ where the end points are fixed, is extremum if y satisfies the differential equation $F_y - \frac{d}{dx}Fy' = 0$. 5

UNIT—IV

8. (a) Obtain Hamilton Equations. Prove that if a generalised co-ordinate does not appear in H, then the corresponding conjugate momentum is conserved. 2+2

(b) Derive Lagrange's equations for nonholonomic conservative system. 6

9. (p) Derive the Hamilton's equations from variational principle. 5

(q) Construct the Routhian in spherical polar coordinates for a particle moving in space under the action of a conservative force field. 5

UNIT—V

10. (a) Prove that the change in the components of a vector under the infinitesimal transformation of the coordinate system is given by $d\vec{r} = \vec{r} \times d\vec{u}$. 5

(b) If A is any 2×2 orthogonal matrix with determinant $|A| = 1$, then prove that A is a rotation matrix. 5

11. (p) Define infinitesimal rotation. Prove that Infinitesimal rotation matrix ϵ is antisymmetric. 5

(q) Show that the angle of rotation ϕ is given in terms of Eulerian angles by :

$$\cos\frac{\phi}{2} = \cos\frac{\theta}{2} \cdot \cos\frac{1}{2}(\phi + \psi).$$ 5

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Sitabai Arts, Commerce & Science College, Akola

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Subject - Mathematics

B.Sc. Part 3 (Sem-VI) Paper – XI (Linear Algebra)

Preliminary Examination [Year-2019]

Time: Three Hours] **[Maximum Marks: 60**

Note: (1) Question No. 1 is compulsory and attempts it at once only. (2) Solve ONE question from each unit.

1. Choose the correct alternative (1 mark each) :

(i) S is a non-empty subset of vector space V, then the smallest subspace of V containing S is :

(a) S (b) {S}

(c) [S] (d) None

(ii) Let U and V be finite dimensional vector spaces and $T : U \to V$ be a linear map one-one and onto, then :

(a) dim U = dim V (b) dim U ≠ dim V

(c) U = V (d) U ≠ d

(iii) Let W is subspace of vector space V. Then $\{f \in \hat{V} / f(w) = 0, \forall\ w \in W\}$ is called as :

(a) Hilatory of W (b) Annihilator of W

(c) Dual space of W (d) None

(iv) The normalized vector (1, –2, 5) is :

(a) (1, –2, 5) (b) $\left(\frac{1}{\sqrt{30}}, \frac{-2}{\sqrt{30}}, \frac{5}{\sqrt{30}}\right)$

(c) $\left(\frac{1}{2}, -1, \frac{5}{2}\right)$ (d) $\left(\frac{1}{5}, \frac{-2}{5}, 1\right)$

(v) In IPS V(F) the relation $\| u + v \|^2 + \| u - v \|^2 = 2 (\| u \|^2 + \| v \|^2)$ is called as :

(a) Schwartz inequality (b) Triangle law

(c) Parallelogram law (d) Bessels inequality

(vi) For two subspaces U and W of V(F), $V = U \oplus W \Leftrightarrow$ .....

(a) $U \cap W = \{0\}$ (b) $V = U + W$

(c) $U \cap W = \{0\}$ and $V = U + W$ (d) None of these

(vii) Let T : M → N be an R-homomorphism. If B is a submodule of N, then :

(a) $T^{-1}(B)$ is submodule of N (b) $T^{-1}(B)$ is submodule of M

(c) $T^{-1}(B)$ is kernel of R homomorphism (d) $T^{-1}(B) = T(M)$

(viii) If T : U → V then the set $\{T(u) \mid u \in U\}$ = ...

(a) Ker T (b) R(u)

(c) R(T) (d) None of these

(ix) If $\| V \| = 1$, then V is called :

(a) Normalised (b) Orthonormal

(c) Scalar inner product (d) Standard inner product

(x) If $\hat{V}$ is n-dimensional, then the dimension of V is :

(a) Less than n (b) Greater than n

(c) Equal n (d) Zero 10

UNIT—I

2. (a) Let U and W be two subspaces of a vector space V and Z = U + W. Then prove that Z = U ⊕ W iff $z \in Z$, z = u + w is unique representation for $u \in U$ and $w \in W$. 5

(b) Extend the linearly independent set $\{(1, 1, 1, 1) (1, 2, 1, 2)\}$ in V_4 to a basis for V_4. 5

3. (p) If U and W are finite dimensional subspaces of vector space V, then prove that :

$$\dim(U + W) = \dim U + \dim W - \dim(U \cap W).$$ 5

(q) Let R^+ be the set of all positive real numbers. Define the operations of addition ⊕ and scalar multiplication ⊗ as follows :

$u \oplus v = u \cdot v \; \forall \; u, v \in R^+$

and $\alpha \otimes u = u^\alpha$, $\forall \; u \in R^+$ and $\alpha \in R$

Prove that R^+ is a real vector space. 5

UNIT—II

4. (a) If U, V is a vector space over a field F and T : U → V be a linear, then prove that :

$$T(\alpha_1 u_1 + \alpha_2 u_2 + \ldots\ldots + \alpha_n u_n) = \alpha_1 T(u_1) + \alpha_2 T(u_2) + \ldots\ldots + \alpha_n T(u_n)$$

$\forall \; u_i \in U, \alpha_i \in F, 1 \le i \le n$ and $n \in N$.

2

(b) Let $T : V_3 \to V_3$ be a linear map defined by $T(e_1) = (1, 1, 1)$, $T(e_2) = (1, -1, 1)$, $T(e_3) = (1, 0, 0)$, $T(e_4) = (1, 0, 1)$.

Verify Rank-nullity theorem. 4

(c) Find the matrix of the linear map $T : V_2 \to V_3$ defined by $T(x, y) = (-x + 2y, y, -3x + 3y)$ related to the bases $B_1 = \{(1, 2), (-2, 1)\}$ and $B_2 = \{(-1, 0, 2), (1, 2, 3), (1, -1, 1)\}$. 4

5. (p) Let U and V be vector spaces over the same field F. Then prove that function $T : U \to V$ is linear iff $T(\alpha u + \beta v) = \alpha T(u) + \beta T(v)$, $\forall\ \alpha, \beta \in F$ and $u, v \in U$. 5

(q) If matrix of a linear map T with respect to bases B_1 and B_2 is :

$$\begin{bmatrix} -1 & 2 & 1 \\ 1 & 0 & 3 \end{bmatrix}$$

where $B_1 = \{(1, 2, 0), (0, -1, 0), (1, -1, 1)\}$ and $B_2 = \{(1, 0), (2, -1)\}$, then find $T(x, y, z)$. 5

UNIT—III

6. (a) Let V be the space of all real valued continuous functions of real variable. Define $T : V \to V$ by

$$(T f)(x) = \int_0^x f(t)\, dt,\ \forall\ f \in V,\ x \in R.$$

Show that T has no eigen value. 5

(b) Prove that if V be a finite dimensional vector space over F and $v(\neq 0) \in V$, then $\exists\ f \in \hat{V}$ such that $f(v) \neq 0$. 5

7. (p) If W_1 and W_2 are subspaces of a finite dimensional vector space V, show that $A(W_1 + W_2) = A(W_1) \cap A(W_2)$. 5

(q) If K_λ is eigenspace, then prove that K_λ is a subspace of vector space V. 3

(r) Define characteristic root and characteristic vector. 2

UNIT—IV

8. (a) In $F^{(n)}$ define for $u = (\alpha_1, \alpha_2, \alpha_3, ..., \alpha_n)$ and $v = (\beta_1, \beta_2 ..... \beta_n)$

$$(u, v) = \alpha_1 \overline{\beta}_1 + \alpha_2 \overline{\beta}_2 + ... + \alpha_n \overline{\beta}_n.$$

Show that this defines an inner product. 4

(b) If $\{x_1, x_2, x_3, ... x_n\}$ be an orthogonal set, then prove that :

$$\| x_1 + x_2 + x_3 + ... + x_n \|^2 = \| x_1 \|^2 + \| x_2 \|^2 + ... + \| x_n \|^2$$ 4

(c) Prove that orthogonal complement i.e. $W^\perp$ is subspace of V. 2

9. (p) If $\{w_1, w_2, ... w_m\}$ is an orthonormal set in V, then $\sum_{i=1}^{m} |(w_i, v)|^2 \leq \| v \|^2$ for any $v \in V$. 4

(q) If V is a finite dimensional inner product space and W is a subspace of V then prove that $(W^{\perp})^{\perp} = W$. 4

(r) (i) Define inner product in vector space. 1

(ii) Define orthogonal set. 1

UNIT—V

10. (a) Let A be a submodule of an R-module M and T is a mapping from M into M/A defined by $T_m = A + m$, $\forall\ m \in M$. Then prove that T is an R-homomorphism of M into M/A and ker T = A. 5

(b) Let T be a homomorphism of an R-module M to an R-module H. Prove that T is one-one iff ker T = {0}. 3

(c) Define :

(i) Submodule

(ii) Unital R-module. 2

11. (p) If A and B are submodules of M, then prove that $\frac{A+B}{B}$ is isomorphic to $\frac{A}{A \cap B}$. 6

(q) Prove that arbitrary intersection of submodules of a module is a submodule. 4

The B.G.E. Society's

Sitabai Arts, Commerce & Science College, Akola

Affiliated to Saint Gadge Baba Amravati University, Amravati (M/S)

Subject - Mathematics

B.Sc. Part 3 (Sem-VI) Paper – XII (Graph Theory)

Preliminary Examination [Year-2019]

Time: Three Hours] **[Maximum Marks : 60**

Note: (1) Question No. 1 is compulsory and attempt it at once only. (2) Solve ONE question from each unit.

1. Choose the correct alternative in the following: 1 mark cach

(i) A connected graph G is an Euler graph iff it can be decomposed into:

(a) Walks. (b) Paths. (c) Cut-sets. (d) Circuits.

(ii) A subgraph H<V1, E1> of a graph G=<V, E> is called a spanning subgraph if:

(a) E=Ø. (b) V^1=Ø (c) V1=V (d) E1 = E

(iii) The concept of a tree introduced by:

(a) Eule. (b) Hamiltonian. (c) Kuratowski. (d) Cayley

(iv) An edge which is not in a spanning tree T is called as :

(a) a branch. (b) a chord. (c) cut set. (d) loop

(v) Euler formula for the planar graph is:

(a) n-e+f=1 (b) n+c-f=2 (c) n-e+f=3. (d) n-e+f=2

vi) For any connected graph with a vertices, e edges its spanning tree has:

(a) n-1 branches. (b) n + 1 branches (c) e-n+1 branches. (d) n-e+1 branches

(vii) In the graph G a circuit vector is a vector in W, representing:

(a) either a circuit or union of edge disjoint circuits

(b) either a cutset or union of edge disjoint cutsets

(c) union of fundamental circuits.

(d) union of fundamental cutsets

(viii) The dimension of the cutset subspace W, is equal to the:

(a) degree of vertices (b) no. of edges (c) rank of the graph (d) nullity of the graph

(ix) A adjacency matrix X(G) is called as :

(a) Symmetric matrix (b) Skew-symmetric matrix (c) Hermitian matrix (d) Skew-Hermitian matrix

(x) The reduced incidence matrix of a graph is nonsingular iff the graph is

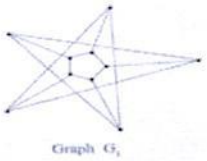
(a) a circuit (b) a cutset (c) a tree (d) a path

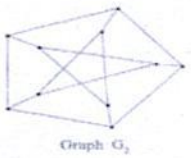
UNIT-I

2. (a) Define:

(i) Subgraph (ii) Connected graph (iii) Walk (iv) Euler graph (v) Hamiltonian path. (5)

(b) When two graphs are said to be isomorphic? Verify that the two graphs given below are isomorphic or not. (5)


Graph G_1


Graph G_2

3. (p) Prove that a connected graph G is an Euler graph if and only if all vertices of G are of even degree. (5)

(q)Define degree of a vertex. Draw graphs of the following chemical compounds:

(i) CH_4 (ii)C_2H_6 (iii)C_6H_6 (iv) H_2O_3 1+1+1+1+1

UNIT-II

4. (a) Define tree and prove that a graph G with n vertices, n - 1 edges and no circuit is connected.

(b) Define center and radius of a tree. Show that every tree has either one or two centers.

5. (p) Define binary tree and show that there are pendant ½(n+1) vertices in a binary tree with n vertices (5)

(q) Prove that a graph T is a tree if and only if there is one and only one path be! Every pair of vertices in T. (5)

UNIT-III

UNIT-III

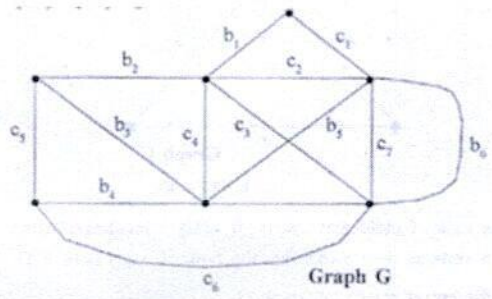
6. (a) Define planar graph. Show that the complete graph with five vertices is non-planar. (5)

(b) If G is a planar graph with n vertices, e edges, f faces and k components

then prove that $n - e + f = k + 1$ (5)

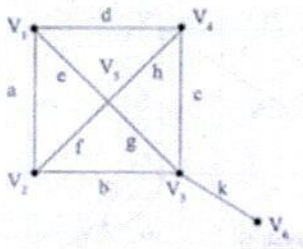
7. (p) For the following graph G find rank of G nullity of G and fundamental circuits with reference to the spanning tree:

$T = \{b_1, b_2, b_3, b_4, b_5 b_6\}$ (5)



Graph G

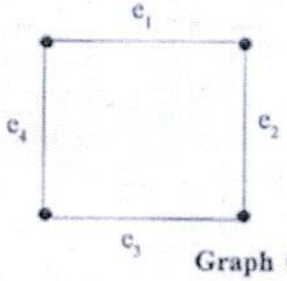
(q) Define a cutset. List all the cutsets in the following graph: (5)



8. (a) Prove that in the vector space of a graph the circuit subspace and the cut-set subspace are orthogonal to each other. (5)

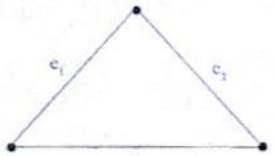
(b) Let G be a graph consisting of a circuit of length four Find the subspaces W W_{r} ,W r cup W s i d W r cap W s with respect to spanning tree $T=\{e_1\ e_2\ e_3\}$ (5)

9. (p) Prove that the set w_{r} of all circuit vectors including zero vector in W forms a subspace of W_G (5)



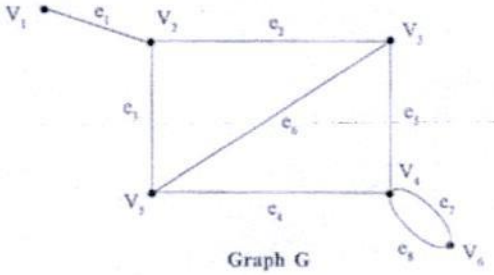
Graph G

(q) For the graph G find W_G, W_s, W_Γ, , $W_s \cap W_\Gamma$ and $W_s \cup W_\Gamma$ with spinning tree$\{e_1,e_2\}$. (5)

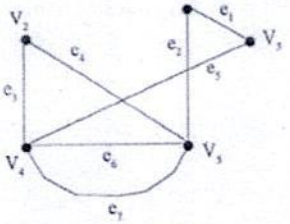


10. (a) Define rank of incidence matrixIf A(G) is incidence matrix of a connected graph G with n vertices then prove that the rank of A(G) is (n - 1) (5)

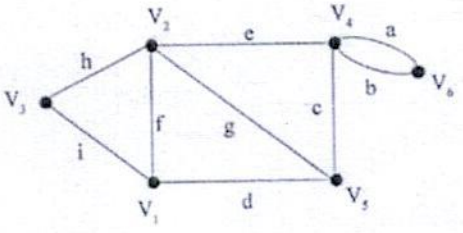
(b) Find the cutset matrix of graph G. (5)



11. (p) Define incidence matrix and find incidence matrix of the following graph. (5)



(q) Define circuit matrix. Find the circuit matrix of the following graph G (5)



Sant GadgeBaba Amravati University ,Amravati

The Berar General Education Society's

Sitabai Arts,Commerce and Science College,Akola

Preliminary Examination 2017-2018

Class B.Sc.I (SemII)

Subject ; Mathematics

Paper IV:- Vector analysis and solid Geometry

Time : Three Hours] [Maximum Marks : 60

N.B. :— (1) Question No. **1** is compulsory and attempt it once only.

(2) Solve **ONE** question from each unit.

1. Choose correct alternative of the following :—

(i) Three vectors $\bar{a}$, $\bar{b}$, $\bar{c}$ are coplaner iff _____.

(a) $\bar{a} \times (\bar{b} \times \bar{c}) = \bar{0}$ (b) $\bar{a} \cdot (\bar{b} \times \bar{c}) = 0$

(c) $(\bar{a} \times \bar{b}) \times \bar{c} = \bar{0}$ (d) $(\bar{a} + \bar{b}) \times \bar{c} = \bar{0}$ 1

(ii) A vector $\bar{f}$ is irrotational if _____.

(a) div $\bar{f} = 0$ (b) div $\bar{f} \neq 0$

(c) curl $\bar{f} = \bar{0}$ (d) None of these 1

(iii) If $\bar{r} = t\vec{i} + \sin t\, \vec{j} + (t^2 - 1)\vec{k}$, then $\dot{\bar{r}}$ at $t = 0$ is _____.

(a) (0, 0, 1) (b) (0, 1, 0)

(c) (1, 1, 0) (d) (1, 0, 1) 1

(iv) For any space curve, $\bar{t}' \cdot \bar{b}' =$ _____.

(a) k (b) J

(c) kJ (d) −kJ 1

(v) If $\bar{r} = \bar{r}(t)$ is equation of space curve, then the curvature k is equal to _____.

(a) $\dfrac{\left[\dot{\bar{r}}\ \ddot{\bar{r}}\ \dddot{\bar{r}}\right]}{\left|\dot{\bar{r}} \times \ddot{\bar{r}}\right|^2}$ (b) $\dfrac{\dot{\bar{r}}}{\left|\dot{\bar{r}}\right|}$

(c) $\dfrac{\dot{\bar{r}} \times \ddot{\bar{r}}}{\left|\dot{\bar{r}} \times \ddot{\bar{r}}\right|}$ (d) $\dfrac{\left|\dot{\bar{r}} \times \ddot{\bar{r}}\right|}{\left|\dot{\bar{r}}\right|^3}$ 1

(vi) If $\bar{r} = x\vec{i} + y\vec{j} + z\vec{k}$, then div. $\bar{r}$ is _____.

(a) 3 (b) -2

(c) 0 (d) -1

(vii) A vector $\bar{f}$ is solenoidal if _____.

(a) div. $\bar{f} = 0$ (b) curl $\bar{f} = \bar{0}$

(c) div. grad $\bar{f} = 0$ (d) curl grad $\bar{f} = \bar{0}$

(viii) Every section of right circular cone by a plane perpendicular to its axis is _____.

(a) plane (b) circle

(c) sphere (d) None of these

(ix) The equation $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ represent a real sphere if _____

(a) $u^2 + v^2 + w^2 = d$ (b) $u^2 + v^2 + w^2 > d$

(c) $u^2 + v^2 + w^2 < d$ (d) $u^2 + v^2 + w^2 = 0$

(x) Two non-parallel planes intersect in a _____.

(a) plane (b) point

(c) line (d) circle

UNIT—I

2. (a) If vectors $\bar{f}$ and $\bar{g}$ are vector functions of t, then prove that

$$\frac{d}{dt}(\bar{f} \circ \bar{g}) = \bar{f} \circ \frac{d\bar{g}}{dt} + \frac{d\bar{f}}{dt} \circ \bar{g}.$$

(b) Prove that $\bar{r} = \bar{a}\, e^{mt} + \bar{b}\, e^{nt}$, where $\bar{a}$, $\bar{b}$ are unit vectors is the solution of

$$\frac{d^2\bar{r}}{dt^2} - (m+n)\frac{d\bar{r}}{dt} + mn\,\bar{r} = 0.$$

(c) If $\bar{f} = 2t^2\vec{i} - t\vec{j} + 2\vec{k}$ and $\bar{g} = 7\vec{i} + t^2\vec{j} - t\vec{k}$, then find $\frac{d}{dt}(\bar{f} \times \bar{g})$.

3. (p) Prove that :

$$\bar{a}\times(\bar{b}\times\bar{c})=(\bar{a}.\bar{c})\bar{b}-(\bar{a}.\bar{b})\bar{c}.$$ 4

(q) If $\bar{a}=t\vec{i}-3\vec{j}+2t\vec{k}$, $\bar{b}=\vec{i}-2\vec{j}+2\vec{k}$ and $\bar{c}=3\vec{i}+t\vec{j}-\vec{k}$, then evaluate $\bar{a}.(\bar{b}\times\bar{c})$. 3

(r) Prove that :

$$(\bar{c}\times\bar{a})\times(\bar{a}\times\bar{b})=[\bar{a}\ \bar{b}\ \bar{c}]\,\bar{a}.$$ 3

UNIT—II

4. (a) State and prove Frenet-Serret formulae. 1+5

(b) If tangent and binormal at a point of a curve makes angle θ, ϕ respectively with fixed direction, then show that :

$$\frac{\sin\theta\,d\theta}{\sin\phi\,d\phi}=\frac{-k}{J}.$$ 4

5. (p) Prove that $[\bar{r}'',\ \bar{r}''',\ \bar{r}'''']=k^3[kJ'-k'J]$. 3

(q) Show that the necessary and sufficient condition that a curve to be a straight line is $k = 0$. 3

(r) Prove that Darboux vector $\bar{d}$ has fixed direction if and only if k/J is constant. 4

UNIT—III

6. (a) Find the work done in moving a particle along the parabola $y^2 = x$ in the xy plane from (0, 0) to (1, 1) if the force field is given by :

$$\bar{f}=(2x+y-7z)\vec{i}+(7x-2y+2z^2)\vec{j}+(3x-2y+4z^3)\vec{k}.$$ 5

(b) Verify Green's theorem in the plane for,

$$\int_c (xy+y^2)dx+x^2dy$$

Where c is the closed curve of the region bounded by $y = x$ and $y = x^2$. 5

7. (p) If $\bar{F}=(3x^2+6y)\vec{i}-14yz\vec{j}+20xz^2\vec{k}$, then evaluate $\int_c \bar{F}.d\bar{r}$ from (0, 0, 0) to (1, 1, 1) along the path $x = t$, $y = t^2$, $z = t^3$. 5

(q) Prove that $r^n\bar{r}$ is irrotational. Find the value of n when it is solenoidal. 5

UNIT—IV

8. (a) A sphere of radius k passes through the origin and meets the axes in A, B, C. Prove that the centroid of the triangle ABC lies on the sphere $9(x^2 + y^2 + z^2) = 4k^2$. 5

(b) Prove that the two spheres

$$x^2 + y^2 + z^2 + 2u_1x + 2v_1y + 2w_1z + d_1 = 0$$

and $x^2 + y^2 + z^2 + 2u_2x + 2v_2y + 2w_2z + d_2 = 0$

will be orthogonal if $2u_1u_2 + 2v_1v_2 + 2w_1w_2 = d_1 + d_2$. 5

9. (p) Find the equation of the sphere that passes through the circle $x^2 + y^2 + z^2 - 2x + 3y - 4z + 6 = 0$, $3x - 4y + 5z - 15 = 0$ and cuts the sphere $x^2 + y^2 + z^2 + 2x + 4y - 6z + 11 = 0$ orthogonally. 5

(q) Two spheres of radii r_1 and r_2 cut orthogonally. Prove that the radius of the common circle is $\frac{r_1 r_2}{\sqrt{r_1^2 + r_2^2}}$. 5

UNIT—V

10. (a) Find the equation of the right circular cylinder of radius 2 and whose axis is the line

$$\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{2}.$$ 5

(b) Find the equation of the right circular cylinder whose radius is r and axis the line :

$$\frac{x-x'}{l} = \frac{y-y'}{m} = \frac{z-z'}{n}.$$ 5

11. (p) Find the equation of a right circular cone whose vertex is (α, β, γ), the semivertical angle α and the axis $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$. 5

(q) Find the equation of right circular cone whose vertex is $(2, -3, 5)$, axis makes equal angles with the coordinate axes and semi vertical angle is $30°$. 5

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Preliminary Examination 2017-2018

Class B.Sc.I (SemII)

Subject ; Mathematics

Paper III: Ordinary and Partial Differential equation

Time : Three Hours] [Maximum Marks : 60

N.B. :— (1) Question No. 1 is compulsory. Solve it in **ONE** attempt only.

(2) Attempt **ONE** question from each unit.

1. Choose the correct alternative :

(i) The DE $\frac{dy}{dx} + Py = Q$, where P and Q are functions of x is known as _____. 1

(a) Exact DE (b) Bernoulli's equation

(c) Linear DE of order one (d) Homogeneous DE of order one.

(ii) The order of the DE $\frac{d^2y}{dx^2} + x^2\frac{dy}{dx} - y \sin x = 0$ is _____. 1

(a) 1 (b) 2

(c) 3 (d) 4

(iii) The particular solution of the DE $y'' + Py' + Qy = 0$ is $y = e^x$ if _____. 1

(a) $P + xQ = 0$ (b) $1 + P + Q = 0$

(c) $1 - P + Q = 0$ (d) $m^2 + mP + Q = 0$

(iv) The DE $y'' - 4y' + 4y = 0$ has roots which are _____. 1

(a) real and equal (b) real and different

(c) complex (d) None of these

(v) The integrating factor (IF) of the DE $\frac{dy}{dx} + 2xy = x$ is _____. 1

(a) x (b) e^x

(c) e^{x^2} (d) e^{-x}

(vi) The value of $\frac{1}{f(D)}e^{ax}, f(a) \neq 0$ is given by _____. 1

(a) $\frac{1}{f(D+a)}e^{ax}$ (b) $\frac{1}{f(D-a)}e^{ax}$

(c) $\frac{1}{f(a)}e^{ax}$ (d) $\frac{1}{f(-a)}e^{ax}$

(vii) The correct value of $\frac{1}{f(D,D')}e^{ax+by}$ is _____. 1

(a) $\frac{1}{f(-a,-b)}e^{ax+by}$ (b) $\frac{1}{f(a,b)}e^{ax+by}$

(c) $\frac{1}{f(-a^2,-b^2)}e^{ax+by}$ (d) None of these

(viii) In PDE $P_p + Q_q = R$, where P, Q and R are functions of _____. 1

(a) x only (b) y only

(c) x and y only (d) x, y and z

(ix) Lagrange's form of the PDE of order one is _____. 1

(a) $P_p + Q_q = R$ (b) $P_p - Q_q = R$

(c) $P_q + Q_p = R$ (d) None of these

(x) The solution of the PDE $r = a^2t$ is _____. 1

(a) $z = F_1(y + ax) + F_2(y - ax)$ (b) $z = F_1(y - ax) + F_2(y - ax)$

(c) $z = F(y + ax)$ (d) None of these

UNIT—I

2. (a) Show that the DE $(e^y + 1)\cos x\, dx + e^y \sin x\, dy = 0$ is exact and hence solve it. 5

(b) Solve the DE $\cos x\, dy = y(\sin x - y)\, dx$. 5

3. (p) Find the orthogonal trajectories of the family of coaxial circles $x^2 + y^2 + 2gx + c = 0$, where g is a parameter. 5

(q) Solve the DE $(p - xy)(p - x^2)(p - y^2) = 0$. 5

UNIT—II

4. (a) Solve the DE $\frac{d^2y}{dx^2} + a^2y = x \cos ax$. 5

   (b) Solve the DE $(x^2D^2 - 3xD + 5)y = x^2 \sin (\log x)$. 5

5. (p) Solve the DE $y'' + 3y' - 2y = 4x - 20 \cos 2x$. 5

   (q) Solve the DE $\frac{d^2y}{dx^2} + 4y = e^x + \sin 2x$. 5

UNIT—III

6. (a) Find the particular solution of $y'' - 2y' + y = 2x$ by variation of parameters. 5

   (b) Solve the DE $\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} - y \sin^2 x = \cos x - \cos^3 x$ by changing the independent variable x to z. 5

7. (p) Solve the simultaneous DEs.

   $$\frac{dx}{dt} + 2\frac{dy}{dt} - 2x + 2y = 3e^t; \; 3\frac{dx}{dt} + \frac{dy}{dt} + 2x + y = 4e^{2t}$$ 5

   (q) Solve the DE $x^2y'' - 3xy' + 3y = (2x+1)x^2$. 5

UNIT—IV

8. (a) Solve the PDE $x(y^2-z^2)p + y(z^2-x^2)q = z(x^2-y^2)$. 5

   (b) Form the PDE by eliminating the arbitrary functions from $f(x + y + z, x^2 + y^2 + z^2) = 0$. 5

9. (p) Solve the PDE $p^2 + q^2 = x^2 + y^2$. 5

   (q) Solve the PDE

   $$\frac{dx}{x(y^2 - z^2)} = \frac{dy}{-y(z^2 + x^2)} = \frac{dz}{z(x^2 + y^2)}.$$ 5

UNIT—V

10. (a) Solve the PDE $r + s - 6t = y \cos x$. 5

    (b) Solve the PDE $D(D - 2D' - 3)z = e^{x+2y}$ 5

11. (p) Solve the PDE $r - 3s + 2t = e^{2x+3y} + \sin(x-2y)$. 5

    (q) Solve the PDE $(D^2 - 2DD' - 8D'^2)z = \sqrt{2x + 3y}$. 5

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The Berar General Education Society's
Sitabai Arts,Commerce and Science College,Akola
Preliminary Examination 2017-2018
Class B.Sc.II (SemIV)
Subject ; Mathematics Paper VII ;Modern Algebra(Groups and Rings)

Time : Three Hours] [Maximum Marks : 60

Note :— (1) Question No. **1** is compulsory and attempt it once only.

(2) Solve **ONE** question from each unit.

1. Choose the correct alternative (1 mark each) :

(i) An identity permutation is always an :

(a) Odd permutation (b) Even permutation

(c) Both odd and even (d) None of these

(ii) Which one of the following is a group under multiplication ?

(a) N (b) Z

(c) R (d) $R - \{0\}$

(iii) Every group of prime order is :

(a) Prime (b) Simple

(c) Normal (d) None of these

(iv) The identity element of the quotient group G/H is :

(a) G/H (b) H/G

(c) G (d) H

(v) A homomorphism of a group into itself is :

(a) Auto morphism (b) Isomorphism

(c) Endomorphism (d) None of these

(vi) Let G and G' be two multiplicative groups. A mapping $\phi : G \to G'$ is called a homomorphism if :

(a) $\phi(ab) = \phi(a)\,\phi(b), \forall\ a, b \in G$ (b) $\phi(a + b) = \phi(a)\,\phi(b), \forall\ a, b \in G$

(c) $\phi\left(\frac{a}{b}\right) = \phi(a) / \phi(b), \forall\ a, b \in G$ (d) None of these

(vii) In ring R if $a^2 = a, \forall\ a \in R$ then R is called :

(a) Division ring (b) Boolean ring

(c) Quotient ring (d) Commutative ring

(viii) A field must contain at least :

(a) One element (b) Two elements

(c) Three elements (d) None of these

(ix) The intersection of two right ideals of R is :

(a) a left ideal of R (b) a right ideal of R

(c) both left and right ideal of R (d) None of these

(x) A ring which has only trivial ideal is called :

(a) Subring (b) Division ring

(c) Commutative ring (d) Simple ring

UNIT—I

2. (a) If G is a group, then prove that $(ab)^{-1} = b^{-1} a^{-1}$, $\forall$ a, b $\in$ G. 4

(b) Prove that every permutation is a product of 2-cycles or transpositions. 3

(c) If H and K are subgroups of G, then show that $H \cap K$ is a subgroup of G. 3

3. (p) Show that the set of cube roots of unity forms an abelian group with respect to the usual multiplication of numbers. 4

(q) Prove that a non empty subset H of the group G is a subgroup of G if and only if a, b $\in$ H $\Rightarrow ab^{-1} \in H$. 3

(r) Prove that every cyclic group is abelian. 3

UNIT—II

4. (a) Prove that N is a normal subgroup of G if and only if $gNg^{-1} = N$, $\forall$ g $\in$ G. 4

(b) Let G = {1, –1, i, –i} and N = {1, –1} then show that N is a normal subgroup of the multiplicative group G. Also find the quotient group G/N. 3

(c) Prove that any two right cosets of a subgroup are either disjoint or identical. 3

5. (p) If G is a finite group and H is a subgroup of G, then prove that O(H) is a divisor of O(G). 4

(q) If G is a group and H is a subgroup of index 2 in G, prove that H is a normal subgroup of G. 3

(r) Let Z be an additive group of integers and let N be subgroup of Z defined by N = {nx / x $\in$ Z}, where n is a fixed integer, then construct the quotient group Z/N. 3

UNIT—III

6. (a) Let G be any group, g a fixed element in G. Define $\phi : G \to G$ by $\phi(x) = gxg^{-1}$, then prove that ϕ is an isomorphism of G onto G. 5

   (b) Let ϕ be a homomorphism of G onto G' with kernel K, then prove that $G/K \approx G'$. 5

7. (p) Define Kernel of homomorphism and show that the mapping $f : C \to R$ defined by $f(x + iy) = x$ is a homomorphism of the additive group of complex numbers onto the additive group of real numbers. Also, find the kernel of f. 5

   (q) If ϕ is an homomorphism of a group G into a group G', then prove that :

   (i) $\phi(e) = e'$

   (ii) $\phi(x^{-1}) = (\phi(x))^{-1} \; \forall \; x \in G$

   where e and e' are the unit elements of G and G' respectively. 5

UNIT—IV

8. (a) Prove that a finite integral domain is a field. 5

   (b) If R is a ring in which $x^2 = x, \forall x \in R$, then prove that R is a commutative ring of characteristic 2. 5

9. (p) Define subring and show that the set of matrices $\begin{bmatrix} a & b \\ 0 & c \end{bmatrix}$ is a subring of the ring R of 2×2 matrices with integral elements. Here a, b, c are integers. 1+4

   (q) Prove that every prime field of finite characteristic $p > 0$ is isomorphic to the field Z_p. Where $Z_p = \{0, 1, 2, \ldots, p - 1\}$ is a field under addition and multiplication modulo p. 5

UNIT—V

10. (a) If U and V are ideals of a ring R, then prove that :

    (i) $U \cap V$ is an ideal of R

    (ii) $U \cap V$ is the largest ideal that is contained in both U and V. 5

    (b) If F is a field, then prove that its only ideals are {0} and F itself. 5

11. (p) If U is an ideal of a ring R, then prove that R|U is a homomorphic image of R. 5

    (q) In a principle ideal domain if p is prime and p|ab, then prove that p|a or p|b. 5

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Preliminary Examination 2017-2018
Class B.Sc.II (SemIV)
Subject ; Mathematics Paper VII Classical Mechanics

Time : Three Hours] [Maximum Marks : 60

Note :— Question No. 1 is compulsory and attempt it once only and solve **ONE** question from each unit.

1. Choose the correct alternative (1 mark each) : 10

(1) The virtual work on a mechanical system by the applied forces and reversed effective forces is :

(a) Zero (b) One
(c) Negative (d) None of these

(2) If q_i is cyclic, then $\frac{\partial H}{\partial q_i} =$

(a) 0 (b) 1
(c) –1 (d) None of these

(3) A particle moving in space has _____ degrees of freedom.

(a) One (b) Two
(c) Three (d) Four

(4) A cyclic co-ordinate will be _____ in Hamiltonian.

(a) Present (b) Absent
(c) Appear (d) None of these

(5) In a central force field, the angular momentum of a particle remains :

(a) Imaginary (b) Zero
(c) Real (d) Constant

(6) For a particle moving under a central force such that $V = Kr^{n+1}$, the virial theorem reduces to :

(a) $2\overline{T} = -n\overline{V}$ (b) $2\overline{T} = (n+1)\overline{V}$
(c) $2\overline{T} = \overline{V}$ (d) $2\overline{T} = -(n+1)\overline{V}$

(7) A stationary point of the function f(x) includes _____.

(a) a maximum point (b) a minimum point

(c) a point of inflection (d) all of these

(8) Two curves which are close in the sense of 3rd order proximity necessarily not be close in the sense of _____ order proximity.

(a) 0^{th} (b) 1^{st}

(c) 2^{nd} (d) 4^{th}

(9) The general displacement of a rigid body with _____ point fixed is a rotation about some axis.

(a) One (b) Two

(c) Three (d) None of these

(10) _____ rotation do not commute.

(a) Infinite (b) Finite

(c) Countable (d) None of these

UNIT—I

2. (a) Derive the Lagranges equations of motion for conservative system from D'Alemberts principle. 6

(b) Find the equations of motion for a particle moving in space by using Cartesian coordinate. 4

3. (p) Construct a Lagrangian for a spherical pendulum and then obtain the Lagrange's equations of motion. 5

(q) Show that the shortest distance between two points in a plane is a straight line. 5

UNIT—II

4. (a) State and prove the virial theorem of the system. 1-4

(b) Derive the differential equation for the orbit of a particle in a central force field. 5

5. (p) Show that if a particle describes a circular orbit under the influence of an attractive central force directed towards point on the circle then the force varies as the inverse fifth power of the distance. 5

(q) Derive the equation of a path of a particle in a central force field in the form :

$$\phi = \phi_0 + \left(\frac{h}{m}\right) \int_{r_0}^{r} \frac{dr}{fr^2}. \qquad 5$$

UNIT—III

6. (a) Prove that the functional $I[y(x)] = \int_{x_1}^{x_2} F(x, y, y')\,dx$ where the end points are fixed, is extremum if y satisfies the differential equation $F_y - \frac{d}{dx} F_{y'} = 0$. 5

(b) Define N^{th} order distance between curve. Find the distance between the curves : $y(x) = x\,e^{-x}$, $y_1(x) = 0$ on $[0, 2]$. 1+4

7. (p) Show that the functional $I[y(x)] = \int_0^1 \{2y(x) + y'(x)\}\,dx$ defined in the space $c_1[0, 1]$ is continuous on the function $y_0(x) = x$ in the sense of first order proximity. 5

(q) Find the extremals of the functional $I[y] = \int_0^{2\pi} (y'^2 - y^2)\,dx$ that satisfies the boundary conditions $y(0) = 1$, $y(2\pi) = 1$. 5

UNIT—IV

8. (a) State and prove least action principle. 5

(b) State Hamilton's principle. Prove that :

$$\frac{dH}{dt} = \frac{\partial H}{\partial t} = -\frac{\partial L}{\partial t}.$$ 5

9. (p) Prove that A cyclic co-ordinate will not occur in the Routhian R. 5

(q) Use Hamilton's principle to find the equations of motion of a particle of mass moving in space in a conservative force field $\vec{F}$. 5

UNIT—V

10. (a) State and prove Euler's theorem. 6

(b) Define infinitesimal rotation. Show that infinitesimal rotations commute. 4

11. (p) Prove that :

(i) If $A = I + \epsilon$, then the inverse rotation matrix $A^{-1} = I - \epsilon$. 3

(ii) Infinitesimal rotation matrix ϵ is antisymmetric. 3

(q) Prove that a rotation matrix A is orthogonal. 4

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Sitabai Arts, Commerce & Science College, Akola

Affiliated to Saint Gadge Baba Amravati University, Amravati (M/S)

Subject - Mathematics

B.Sc. Part 1 (Sem-II) Paper – III (Vector Analysis & Solid Geometry)

Preliminary Examination [Year-2022]

Time: Three Hours] **[Maximum Marks:** 60

Note: (1) Question **No. 1** is compulsory (2) Solve **ONE** question from each unit.

Q1. Choose the correct alternative in the following: 1 mark each

(i) The cross product of any two non-zero vectors is a_____

(a) Scalar (b) Vector (c) Both Scalar and Vector (d) None of these

ii) A Vector f is irrotational if _____

(a) div **f** = 0 (b) curl **f** = 0 (c) div **f** ≠0 (d) curl **f**≠ 0

iii) The equation of osculating plane is_____

(a) (R- r). **t**=0 (b) (R-r). **b**=0 (c) (R - r).**n** = 0 (d) none of these

(iv) A line perpendicular to both **t** and **n** is called_____

(a) tanget line (b) binormal line (c) principal normal line (d) none of these

(v) For any space curve $t' \cdot b' =$_____

(a) k (b) j (c) kj (d) – kj

(vi) If $\mathbf{r} = x_i + y_j + z_k$ then div **r** is equal to _____'

(a) Zero (b) One (c) Two (d) Three

(vii) A plane section of a sphere is a _____

(a) Sphere (b) Circle (c) Both Sphere and Circle (d) None of these

(viii) The equation $x^2 + y^1 + 2ux + 2vy + 2wz + d = 0$ represents a real sphere if_____

(a) $u^2+v^2+w^2 = d$ (b) $u^2+v^2+w^2 > d$ (c) $u^z+v^2+w^2 < 0$ (d) $u^2+v^2+w^2=0$

(ix) In right Circular Cylinder, the radius of the circle is the radius of the_____

(a) Circle (b) Sphere (c) Cylinder (d) Cone

(x) Every section of a right circular cone by a plane perpendicular to its axis is a _____

(a) Plane (b) Circle (c) Sphere (d) Cone

UNIT-I

(a) Prove that $(\mathbf{a}\times\mathbf{b}) \times (\mathbf{a}\times\mathbf{c}).\mathbf{d} = (\mathbf{a}.\mathbf{d})[\mathbf{a}\ \mathbf{b}\ \mathbf{c}]$ 4

(b) If f and g are functions of x, y, z then prove that $\frac{\partial}{\partial x}(\mathbf{f}.\mathbf{g}) = \mathbf{f}.\frac{\partial g}{\partial x} + \mathbf{g}.\frac{\partial f}{\partial x}$ 3

(c) If $\mathbf{r}(t) = 5t^2\mathbf{i} + t\mathbf{j} - t^3\mathbf{k}$. Then prove that $\int_1^2 \boldsymbol{r} \times \frac{d^2r}{dt^2}dt = -14\mathbf{i}+75\mathbf{j}-15\mathbf{k}$ 3

Q3. (p) If $\mathbf{a}=a_1\mathbf{i}+a_2\mathbf{j}+a_3\mathbf{k}$. $\mathbf{b}=b_1\mathbf{i}+b_2\mathbf{j}+b_3\mathbf{k}$. $\mathbf{c}=c_1\mathbf{i}+c_2\mathbf{j}+c_3\mathbf{k}$. Then prove that

$\mathbf{a}.(\mathbf{b}\times\mathbf{c}) = \mathbf{b}(\mathbf{c}\times\boldsymbol{a}) = \mathbf{c}.(\mathbf{a}\times\mathbf{b})$ 4

(q) If $\mathbf{f} = 2t^2\mathbf{i} - t\mathbf{j} + z\mathbf{k}$. $G = 7\mathbf{i}+t^2\mathbf{j}-t\mathbf{k}$. Then find $\frac{d}{dt}(f \times g)$. 3

(r) Prove that a necessary and suf[icient condition that

$\mathbf{a}\times(\boldsymbol{b}\times\boldsymbol{c}) = (\mathbf{a}\times\mathbf{b})\times\boldsymbol{c}$ is $(\boldsymbol{a}\times\boldsymbol{c})\times\boldsymbol{b}=0$ 3

UNIT II

Q4 a) Prove that Darboux Vector k has fixed direction if and only if K/J is constant. 5

b) Find the equations of the tangent to the curve $x = 3t, y = 3t^2, z = 2t^3$ at the point t = 1. 5

Q5 p) State and prove Serret-Frenel formulae. 4

q) Show that the necessary and sufficient condition that a curve to be a straight line is k=0. 3

r) Find the curvature and torsion of the circularhelix $x=a\cos\theta, y=a\sin\theta. z=c\theta$ at any point. 3

UNIT III

Q6 (a) $\mathbf{F}=(3x^2+6y)\mathbf{i}-14yz\mathbf{j}+20xz^2\mathbf{k}$, then evaluate $\int_c \boldsymbol{F}\boldsymbol{d}\boldsymbol{r}$ from(0, 0, 0) to (1, 1. 1) along the path $x = t, y = t^2, z = t^3$. 4

b)If $\mathbf{r} = x\mathbf{i}+y\mathbf{j}+z\mathbf{k}$ then find:

(i) grad $|\boldsymbol{r}|$

(ii) div. $\mathbf{r}$

(iii) curl $\mathbf{r}$. 2+2+2

Q7 p) Verily Green's theorem in thc plane for $\int_c (xy + y^2)dx + x^2dy$, where C is the closed curve of the region bounded by y: x and $y = x^2$. 4

q) If $\mathbf{f} = x^2z\mathbf{i} - 2y^3z^2\mathbf{j} + xy^2z\mathbf{k}$ then find div $\mathbf{f}$ and curl $\mathbf{f}$ at (1,-1, 1) . 3

r) Find the work done in moving a particle once around a circle C in the xy plane of radius 2 and centre (0, 0) and if the force field is given by $\mathbf{f} = 3xy\mathbf{i} - y\mathbf{j} + 2zx\mathbf{k}$. 3

UNIT-IV

Q8 a) Two spheres of radii r_1 and r_2 cut orthogonally. Prove that the radius of thc common circle is $\frac{r_1 r_2}{\sqrt{r_1^2+r_2^2}}$ **5**

b) Find the equation to the sphere which passes through the points (0,0, 0), (0, 1, -1), (-1, 2, 0) and (1, 2, 3). **5**

Q9 p) Show that the spheres:

$x^z + y^2 + z^2 + 2x - 6y - 14z + 1 = 0$ and

$x^2 + y^t + 2^2 - 4x - 8y + 2z + 5 = 0$ are orthogonal. **5**

q) Find the equation of the sphere through the circle $x^2 + y^2 + z^2 = 9$, $2x + 3y + 4z = 5$ and. The point (1,2, 3). **5**

UNIT V

Q10 a) Find the equation of right circular cylinder which passes through the circle $x^2+y^2+z^2 = 9$, $x - y + z = 3$. **5**

b) Find the equation of the right circular cylinder of radius 2 and whose axis is the line $\frac{x-1}{2} = \frac{y}{3} = \frac{z-3}{1}$ **5**

Q11 p) Prove that the equation of a cone with vertex at the origin is homogeneous. **5**

q) Find the equation of the cone whose vertex is at the point $(\alpha, \beta,$ y) and whose generators touch the sphere $x^2 + y^2 + z^2 = a^2$ **5**

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Subject - Mathematics

B.Sc. Part 1 (Sem-II) Paper – III (Differential Equation: Ordinary & Partial)

Preliminary Examination [Year-2022]

Time: Three Hours] [Maximum Marks : 60

Note: (1) Question No. 1 is compulsory (2) Solve ONE question from each unit.

Q1. Choose the correct alternative in the following: 1 mark each

(i) The order of the D.E. : $(\frac{d^3x}{dx^3})^4 - (\frac{dy}{dx})^3 - y=0$ is----------

(a)1 (b) 2 (c) 3 (d) 4

(ii) The DE $\frac{dy}{dx} + Py = Q$ where P and Q are functions of x is known as:----------

(a) Exact DE (b) Bernoulli's equation (c) Linear DE of order 1 (d) Homogenous DE

(iii) The roots of the auxiliary equations of the D.E. y" - 5y' + 6y = 0 are

(a) Real and equal (b) Complex (c) Real and distance (d) None of these

(iv) The D.E. Mdx + Ndy= 0 is exact if:

(a) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial x}$ (b) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial y}$ (c) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ (d) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

(v)The inlegrating factor of the D.E. $\frac{dy}{dx} + 2xy = x$

(al x (b) e^x (c) e^{x^2} (d) e^{-x}

(vi) The PI of $f(D)y = e^{ax}$ is given by : ----------

(a) $\frac{1}{f(D+a)} e^x$ (b) $\frac{1}{f(a)} e^x : f(a) \neq 0$ (c) $\frac{1}{f(D-a)} e^{ax}$ (d) $\frac{1}{f(a)} e^{ax} : f(a) \neq 0$

(vii) Lagranges form of the PDE of order one is: ----------

(a) Pp+Qq=R (b) Pq – Qp= R (c) Pq+Qp=R (d) none of these

(viii) The solution of PDE $z = a^2t$ is:----------

(a) $z = F_1(y+ ax) + F_2(y- ax)$ (b) $z = F_1(y- ax) + F_2(y- ax)$ (c) z=f(y+ax) (d) none of these

(ix) The general solution of thc PDE F(D, D')z = 0 is consist of

(a) C.F. only (b)P.I. only (c) C.F. and P.I. both (d) none of these

(x) The P.I. of the PDE $(2D - 3D')z = e^{x-y}$ is :----------

(a) $\frac{1}{5} e^{x-y}$ (b) $-\frac{1}{5} e^{x-y}$ (c) e^{x-y} (d) $-e^{x-y}$

UNIT-I

Q2. (a) Solve the D.E $xy - \frac{dy}{dx} = y^3 e^{x^2}$ 5

(b)Solve the DE cos x dy+y (sin x-y)dx 5

Q3. (p) Find the D.E. satisfied by the system of parabolas y2=4a(x+a) :

and show that the orthogonal trajcctodcs of the system belong to the system itself. 5

(q) Show that D.E. : $(e^x + 1)\cos x dx + e^y \sin y\, dy = 0$ is exact and hence solve it. 5

UNIT-II

Q4. (a) Solve the D.E. $y'' - 4y' + 4y = e^{2x} + \sin 2x$. 5

(b) Solve the D.E. $(x^2D^2 + 3xD + 5)y = x^2 \sin(\log x)$. 5

Q5. (p) Solve the D.E. $y'' + 3y' + 2y = e^{5x}$. 5

(q) Solve the D.E. $y'' + 2y' + 2y = x$? 5

UNIT-III

Q 6. (a) Solve the D.E. $y'' - y = \frac{2}{1+e^x}$ by the method of variation of parameters. 5

(b) Solve the simultaneous DE $\frac{dx}{dt} - 2\frac{dy}{dt} - 2x + 2y = 3e^t$; $3\frac{dx}{dt} + \frac{dy}{dt} - + 2x + y = 3e^{2t}$ 5

Q 7 (p) Solve the D.E. by changing the independent variable $x^6y'' + 3x^5y' + a^2y = \frac{1}{x^2}$. 5

(q) Solve the D.E. by reducing it to normal form $y'' - 2xy' + (x^2 + 2)y = e^{\frac{x^2+2x}{2}}$ 5

UNIT-IV

Q 8 (a) Solve the PDE $x(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$. 5

(b) Solve the PDE $p^2 + q^2 = x^2 + y^2$. 5

Q 9 (p) Solve : $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$. 5

(q) Solve the PDE $z^2(1 + p^2 + q^2) = k^2$. 5

UNIT-V

Q 10 (a) Apply Charpit's method to solve $z^2 = pqxy$. 5

(b) Solve PDE $r - 3s + 2t = e^{2x+3y} + \sin(x - 2y)$. 5

Q 11 (p) Solve the PDE $D(D - 2D' - 3)z = e^{x+2y}$. 5

(q) Solve the PDE $r + s - 6t = y \cos x$. 5

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B.Sc II, Sem IV, Mathematics Paper: VIII (Classical Mechanics)

Preliminary Exam

Session 2021-2022

Time: Three Hours] [Maximum Marks: 60

Note: (1) Question No. 1 is compulsory (2) Solve ONE question from each unit.

1. Choose the correct alternative :

(i) If the equation of constraint does not depend on time t explicitly, then the type of constraints are called as :

(a) Moving or Rheonomous constraint

(b) Stationary or Scleronomous constraint

(c) Holonomic constraint

(d) None of these 1

(ii) The polar equation of a conic section is :

$$\frac{\ell}{r} = 1 + e\cos(\theta - \theta_0)$$

where l is its semi latus rectum and e is eccentricity.

If $e > 1$ then the conic represents :

(a) Hyperbola (b) Parabola

(c) Circle (d) Ellipse 1

(iii) A point $x = x_0$ is called a stationary point of a function $f(x)$ if :

(a) $f'(x_0) \neq 0$ (b) $f'(x_0) = 0$

(c) $f'(x_0) > 0$ (d) $f'(x_0) < 0$ 1

(iv) The shortest distance between two points in a plane is :

(a) A circle (b) A straight line

(c) An ellipse (d) A parabola 1

(v) L is the Lagrangian of the system then a generalized coordinate q_i is said to be cyclic if :

(a) $\frac{\partial L}{\partial q_i} \neq 0$ (b) $\frac{\partial L}{\partial q_i} > 0$

(c) $\frac{\partial L}{\partial q_i} = 0$ (d) $\frac{\partial L}{\partial q_i} < 0$ 1

(vi) A 3×3 matrix A is a rotation matrix. Then A is orthogonal and :

(a) $|A| = 0$ (b) $|A| \neq 1$

(c) $|A| = 1$ (d) None of these 1

(vii) A square matrix A is said to be orthogonal if :

(a) $A = A^T$ (b) $A = A^{-1}$

(c) $A^T = A^{-1}$ (d) None of these 1

(viii) Every infinitesimal rotation matrix is :

(a) Symmetric (b) Antisymmetric

(c) Neither symmetric nor antisymmetric (d) None of these 1

(ix) The number of degrees of freedom for a motion of a particle in space are :

(a) 0 (b) 1

(c) 2 (d) 3 1

(x) For a particle moving under inverse square law, the virial theorem reduces to :

(a) $\overline{T} = \overline{V}$ (b) $2\overline{T} = \overline{V}$

(c) $2\overline{T} = -\overline{V}$ (d) $\overline{T} = -\overline{V}$ 1

UNIT—I

2. (a) Prove that the Lagrange's equations of motion can be written in the form :

$$\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}_i}\right) - \frac{\partial L}{\partial q_i} = Q'_i$$

for a system which is partly conservative. The quantity L refers to the conservative part and Q'_i to the forces which are not conservative. 6

(b) Discuss the motion of a particle in a plane by using polar coordinates. 4

3. (p) Construct the Lagrangian for a particle moving in space and then deduce the equations of motion. 5

(q) Using Lagrange's equation of motion, find the equation of path of a particle of mass m which is projected with initial velocity u at an angle α with the horizontal. 5

UNIT—II

4. (a) Prove that for a central force field F, the path of a particle of mass m is given by :

$$\frac{d^2u}{d\theta^2}+u=-\frac{m}{h^2u^2}F\left(\frac{1}{u}\right), \text{ where } u=\frac{1}{r}. \quad 5$$

(b) Prove that for a particle moving under a central force such that $V = kr^{n+1}$, the virial theorem reduces to $2\overline{T}=(n+1)\overline{V}$. 5

5. (p) Show that the central force problem is soluble in terms of elliptic functions when the force is a power law function of the distance with the following fractional exponents :

$$n=-\frac{3}{2},-\frac{5}{2},-\frac{1}{3},-\frac{5}{3},-\frac{7}{3}. \quad 5$$

(q) A particle moves on a curve $r^n = a^n \cos n\theta$ under the influence of a central force field. Find the law of force. 5

UNIT—III

6. (a) Find the shortest curve joining the points (x_1, y_1) and (x_2, y_2) in a plane. 5

(b) Find the extremals of the functional :

$$I[y(x)] = \int_{-1}^{0}(480+y'^{2})\,dx;$$

$$y(0)=0,\ y(-1)=\frac{1}{3},\ y'(0)=0,\ y'(-1)=-2,\ y''(0)=0,\ y''(-1)=8. \quad 5$$

7. (p) Find the extremals of $I[y(x)]=\int_a^b [y^2+y'^2+2ye^x]\,dx$. 5

(q) Find the extremals of the functional :

$$I[y(x)]=\int_0^{\pi}(y'^2-y^2+4y\cos x)\,dx,\ y(0)=0,\ y(\pi)=0. \quad 5$$

UNIT—IV

8. (a) Derive Hamilton's equations from variational principle. 6

(b) Prove that A cyclic coordinate will be absent in Hamiltonian. 4

9. (p) Obtain the Hamiltonian and then deduce the equations of motion for a simple pendulum. Show that the Hamiltonian of the system is the total energy and also the constant of motion. 6

(q) Use Hamilton's principle to find the equations of motion of a particle of mass moving in space in a conservative force field F. 4

UNIT—V

10. (a) Describe the frame rotation and obtain the rotation matrix. 5

(b) If 3×3 matrix A is a rotation matrix, then prove that A is orthogonal and $|A| = 1$. 5

11. (p) Prove that the infinitesimal rotation matrix is antisymmetric. 5

(q) If x, y, z and x', y', z' be two Cartesian systems fixed in space and fixed in the rigid body respectively, then prove that the inverse transformation from body set axes to space set axes is :

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = A^t \begin{bmatrix} x' \\ y' \\ z' \end{bmatrix}$$

where A is the transformation matrix. 5

The B.G.E.Societies

Sitabai Arts, Commerce & Science College Akola

Affiliated to Saint Gadge Baba Amravati University, Amravati (M/S)

B.Sc II, Sem IV, Mathematics Paper: VII (Modern Algebra)

Preliminary Exam

Session 2021-2022

Time : Three Hours] [Maximum Marks : 60

Note :—(1) Question No. 1 is compulsory and attempt it once only.

(2) Solve **ONE** question from each unit.

1. Choose the correct alternative (1 mark each) : 10

(i) A group having only improper normal subgroup is called _____.

(a) a finite group (b) a permutation group

(c) a simple group (d) None of these

(ii) Every subgroup of a cyclic group is _____.

(a) non abelian (b) cyclic

(c) cyclic but not abelian (d) abelian but not cyclic

(iii) The identity permutation is _____.

(a) even (b) odd

(c) even and odd (d) even or odd

(iv) Let G be a group. Then $(ab)^{-1}$ is equal to _____.

(a) $a^{-1}b^{-1}$ (b) $b^{-1}a^{-1}$

(c) $(ba)^{-1}$ (d) None of these

(v) A homomorphism of a group into itself is _____.

(a) a homomorphism (b) an isomorphism

(c) an endomorphism (d) None of these

(vi) An integral domain has at least _____.

(a) One element (b) Two element

(c) Three element (d) None of these

(vii) If in a ring R, $x^2 = x \ \forall \ x \in R$, then R is _____.

(a) Commutative ring (b) Division ring

(c) Boolean ring (d) Ring with unity

(viii) A field which contains no proper subfield is called _____.

(a) Sub field (b) Prime field

(c) Integral domain (d) Division ring

(ix) The intersection of two left ideals of a ring R is _____.

(a) left ideal of R (b) right ideal of R

(c) both (a) and (b) (d) None of these

(x) The characteristic of an integral domain is :

(a) even number (b) odd number

(c) prime number (d) None of these .

UNIT–I

2. (a) Prove that the set $G = \{1, W, W^2\}$ is a group w.r.t. multiplication. 4

   (b) Prove that every subgroup of a cyclic group is cyclic. 4

   (c) If $f = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$ and $g = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix}$ then prove that $f.g \neq g.f$. 2

3. (p) Let G be a group. Prove that a non-empty subset H of G is a subgroup of G iff $a, b \in H \Rightarrow a.b^{-1} \in H$. 4

   (q) Find whether the following permutations are even or odd : 4

   (i) $f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 1 & 5 & 2 & 4 \end{pmatrix}$

   (ii) $g = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 6 & 4 & 1 & 5 & 2 \end{pmatrix}$

   (r) Define : 2

   (i) Cyclic group

   (ii) Order of an element of a group.

UNIT–II

4. (a) If H is a subgroup of a group G, then prove that any two right (left) cosets of H in G are either identical or disjoint. 5

   (b) Prove that N is a normal subgroup of G if and only if $gNg^{-1} = N \ \forall \ g \in G$. 5

5. (p) Show that if G is abelian, then the quotient group G/N is also abelian. 3

   (q) Let H be a subgroup of G and $N(H) = \{g \in G \mid gHg^{-1} = H\}$. Show that H is normal in G iff $N(H) = G$. 4

   (r) Prove that the intersection of two normal subgroups of a group is a normal subgroup of G. 3

UNIT–III

6. (a) If ϕ is a homomorphism of G into G′ with Kernel K, then prove that K is a normal subgroup of G. 4

   (b) If ϕ is homomorphism of a group G into a group G′, then prove that :

   (i) $\phi(e) = e'$ and

   (ii) $\phi(x^{-1}) = (\phi(x))^{-1} \ \forall \ x \in G$

   where e and e′ are identities of G and G′ respectively. 3

   (c) Let G be a group of real numbers under addition and $\phi : G \to G$ such that $\phi(x) = 13x \ \forall \ x \in G$, then prove that ϕ is homomorphism. 3

7. (p) If ϕ is homomorphism of G onto G′ with Kernel K, then prove that $G/K \approx G'$. 5

   (q) Define :

   (i) Homomorphism

   (ii) Kernel of homomorphism.

   Prove that any Kernel is non-empty. 2+3

UNIT–IV

8. (a) Prove that the intersection of any family of subrings of a ring R is a sub ring of R. 3

   (b) If in a ring R, $x^3 = x \ \forall \ x \in R$, then show that R is commutative. 4

   (c) Let the characteristic of the ring R be 2 and let $ab = ba \ \forall \ a, b \in R$ then show that $(a + b)^2 = a^2 + b^2$. 3

9. (p) Prove that Prime field of characteristic zero is isomorphic to the field Q of rational numbers. 5

   (q) Let R be a ring with a unit element, 1, in which $(ab)^2 = a^2b^2 \ \forall \ a, b \in R$. Then prove that R is commutative. 5

UNIT–V

10. (a) If U is an ideal of a ring R with unity 1 and $1 \in U$, then prove that U = R. 2

    (b) If R is a commutative ring with a unit element and M is an ideal of R, then prove that M is a Maximal ideal of R iff R|M is a field. 5

    (c) Let R be a commutative ring with unity. Then prove that every maximal ideal of R is a prime ideal. 3

11. (p) If U is an ideal of ring R, then prove that R|U is a homomorphic image of R. 4

    (q) Let M be the ring of matrices of order 2 over the field R of real numbers and $U = \left\{ \begin{bmatrix} a & b \\ 0 & 0 \end{bmatrix} | a, b \in R \right\}$. Prove that U is a right ideal of M but U is not left ideal. 3

    (r) Let $U = \{19n \mid n \in z\}$ be an ideal of the ring of integers Z and V be an ideal of Z with $U \subset V \subset Z$. Then prove that V = U or V = Z. 3

The B.G.E. Society's

Sitabai Arts, Commerce & Science College, Akola

Affiliated to Saint Gadge Baba Amravati University, Amravati (M/S)

Subject - Mathematics

B.Sc. Part 3 (Sem-VI) Paper – XI (Linear Algebra)

Preliminary Examination [Year-2022]

Time : Three Hours] [Maximum Marks : 60

Note :— (1) Question No. **1** is compulsory. Attempt it once only.

(2) Attempt **ONE** question from each unit.

1. Choose the correct alternative : 10

(i) A non empty subset U of a vector space V(F) is a subspace of V iff :

(a) $\alpha\beta + uv \in U$ (b) $\alpha u + \beta v \in V$

(c) $\alpha u + \beta.v \in U$ (d) $\alpha u - \beta v \in V$ for all $\alpha, \beta \in F$ and $u, v \in U$

(ii) Any subset of linearly independent set is :

(a) linearly dependent

(b) linearly dependent and linearly independent

(c) linearly independent

(d) None of these

(iii) If $T : u \to v$ is linear map then R(T) is subset of :

(a) V (b) $U \cap V$

(c) U (d) $U \cup V$

(iv) An element of dual space V is called a :

(a) Linear element (b) Linear functional

(c) Bilinear element (d) None of these

(v) If u, v be finite dimensional vector spaces and $T : u \to v$ be a linear one-one and onto map, then :

(a) dim U = dim V (b) dim $U \neq$ dim V

(c) U = V (d) $U \neq V$

(vi) If V is the finite dimensional vector space over F then :

(a) $V \cong \hat{V}$ (b) $V \neq \hat{V}$

(c) $\hat{V} = \{0\}$ (d) None of these

(vii) If $\| V \| = 1$ then V is called :

(a) Orthogonal (b) Null vector

(c) Normalised (d) None of these

(viii) The normalised vector of (1, –2, 5) is :

(a) $\left(\frac{1}{\sqrt{30}}, \frac{-2}{\sqrt{30}}, \frac{5}{\sqrt{30}}\right)$ (b) $\left(\frac{1}{2}, -1, \frac{5}{2}\right)$

(c) $\left(\frac{1}{5}, \frac{-2}{5}, -1\right)$ (d) (1, –2, 5)

(ix) R-Module homomorphism is linear transformation if :

(a) R-with unit element (b) R is commutative

(c) R-is a field (d) None of these

(x) If the ring R has a unit element 1 and 1.a = a for all a ∈ M then M is called :

(a) A unital R-module (b) Right R-module

(c) Left-R-module (d) None of these

UNIT—I

2. (a) Define a basis of a vector space. If $\{v_1, v_2, ..., v_n\}$ is a basis of V over F and if $w_1, w_2, ..., w_m \in V$ are L.I. over F, then prove that $m \leq n$. 1+4

(b) Define a subspace of a vector space and prove that the non empty subset U of a vector space V(F) is a subspace of V iff $\alpha u + \beta v \in U \; \forall \; \alpha, \beta \in F, u, v \in U$. 1+4

3. (p) Prove that the intersection of two subspaces of a vector space is again a subspace. Is the statement true for union ? Justify. 5

(q) Find span of S = {(1, 2, 1), (1, 1, –1), (4, 5, –2)} and then prove that (2, –1, –8) belongs to the span of S but (1, –3, 5) does not belongs to span of S. 5

UNIT—II

4. (a) Let U, V are the vector spaces over a field F and T : u → v be a linear map. Then prove that :

(i) T(0) = 0

(ii) $T(-u) = -T(u) \; \forall \; u \in U$

(iii) $T(\alpha_1 u_1 + \alpha_2 u_2 + ... + \alpha_n u_n) = \alpha_1 T(u_1) + \alpha_2 T(u_2) + ... + \alpha_n T(u_n)$

$\forall \; u_i \in U, \alpha_i \in F, 1 \leq i \leq n$ and $n \in N$. 5

(b) Let $T : V_4 \to V_3$ be a linear map defined by $T(e_1) = (1, 1, 1)$, $T(e_2) = (1, -1, 1)$, $T(e_3) = (1, 0, 0)$, $T(e_4) = (1, 0, 1)$. Verify Rank-Nullity theorem. 5

5. (p) State and prove Rank-Nullity Theorem. 5

(q) Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ be a matrix of linear map T with respect to bases B_1 and B_2 where $B_1 = \{(1, 1, 1), (1, 0, 0), (0, 1, 0)\}$, $B_2 = \{(1, 2, 3), (1, -1, 1), (2, 1, 1)\}$. Find $T : V_3 \to V_3$ such that $A = (T : B_1, B_2)$. 5

UNIT—III

6. (a) Let V be a finite dimensional vector space over F. Then prove that $V \approx \hat{V}$. 5

   (b) Define Annihilator of W. Prove that annihilator of W = A(W) is a subspace of $\hat{V}$. 5

7. (p) If U and V are finite dimensional complex vector spaces and $A : U \to V$, $B : U \to V$ are linear maps, then prove that (i) $(A + B)^* = A^* + B^*$, (ii) $(\alpha A)^* = \overline{\alpha} A^*$. 5

   (q) If S is a subset of a vector space V and $A(S) = \{f \in \hat{V} / f(x) = 0 \ \forall \ s \in S\}$ then prove that A(S) = A(L(S)) where L(S) is the linear span of S. 5

UNIT—IV

8. (a) State and prove Cauchy-Schwarz inequality. 5

   (b) (i) If $\{x_1, x_2, ..., x_n\}$ is an orthogonal set, then prove that :

   $$\| x_1 + x_2 + x_3 + ... + x_n \|^2 = \| x_1 \|^2 + \| x_2 \|^2 + ... + \| x_n \|^2.$$

   (ii) Prove that every orthogonal set is LI. 5

9. (p) Let V be a finite dimensional inner product space. Then prove that V has an orthogonal (orthonormal) set as a basis. 5

   (q) Using Gram-Schmidt process, orthonormalise the set of vectors :

   $\{(1, 0, 1, 0), (1, 1, 3, 0), (0, 2, 0, 1)\}$ of V_4. 5

UNIT—V

10. (a) If M_1 and M_2 are submodules of R-module M, then prove that $M_1 + M_2$ is a sub module of M. Moreover prove that $M_1 + M_2$ is a direct sum of M_1 and M_2 iff $M_1 \cap M_2 = \{0\}$. 5

    (b) Define :

    (i) R-module homomorphism

    (ii) Quotient module

    and prove that if A be a submodule of unital R module M, then prove that M/A is also unital R-module. 1+1+3

11. (p) If H and K are submodules of M then prove that $\frac{H+K}{K} \cong \frac{H}{H \cap K}$. 5

    (q) If T is a homomorphism of a R-module M to R-module H then prove that :

    (i) T(0) = 0

    (ii) $T(-m) = -T(m) \ \forall \ m \in M$

    (iii) $T(m_1 - m_2) = T(m_1) - T(m_2) \ \forall \ m_1 m_2 \in M$. 3

    (r) If M be an R-module and $m \in M$. Then prove that $A = \{rm / r \in R)$ is a submodule of M. 2

The B.G.E. Society's

Sitabai Arts, Commerce & Science College, Akola

Affiliated to Saint Gadge Baba Amravati University, Amravati (M/S)

Subject - Mathematics

B.Sc. Part II1 (Sem-VI) Paper – XII (Graph Theory)

Preliminary Examination [Year-2022]

Time : Three Hours] [Maximum Marks : 60

Note :— (1) Question No. **1** is compulsory and attempt it at once only.

(2) Solve **ONE** question from each unit.

1. Choose the correct alternative in the following :

(i) A connected graph G is an Euler graph iff it can be decomposed into : 1

(a) Walks (b) Paths

(c) Cut sets (d) Circuits

(ii) A subgraph $H = < V_1, E_1 >$ of a graph $G = < V, E >$ is called a spanning subgraph if : 1

(a) $E_1 = \phi$ (b) $V_1 = \phi$

(c) $V_1 = V$ (d) $E_1 = E$

(iii) The concept of a tree was introduced by : 1

(a) Euler (b) Hamiltonian

(c) Cayley (d) Kuratowski

(iv) If G be a circuitless graph with n vertices and k components then G has : 1

(a) n + 1 edges (b) n – 1 edges

(c) n + k edges (d) n – k edges

(v) A graph can be embedded in the surface of a sphere iff it can be embedded in : 1

(a) a plane (b) a circle

(c) a sphere (d) a straight line

(vi) A complete graph of five vertices is : 1

(a) Planar graph (b) Non-planar graph

(c) Null graph (d) Bipartite graph

(vii) Minimum number of linearly independent vectors that spans the vectors in a vector space W_G is called : 1

(a) Basis of vector space (b) Dimension of vector space

(c) Span (d) None of these

(viii) The dimension of the cutspace W_S is equal to the rank of the graph and the number of cutset vectors including 0 in W_S is : 1

(a) r (b) 2^r

(c) 3^r (d) r^2

(ix) A row with all zeros in incidence matrix represents : 1

(a) Pendent vertex (b) Isolated vertex

(c) Odd vertex (d) Even vertex

(x) If B is a circuit matrix of a connected graph G with n vertices and e edges then rank of B is : 1

(a) $e + n - 1$ (b) $e - n - 1$

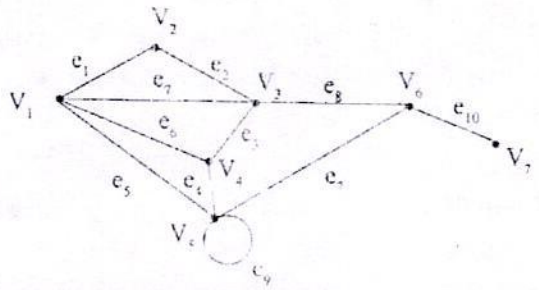
(c) $e + n + 1$ (d) $e - n + 1$

UNIT—I

2. (a) Define (i) Simple graph, (ii) Degree of a vertex. Show that the maximum number of edges in a simple graph of n vertices is $\frac{n(n-1)}{2}$. 2+3

(b) Define isomorphism between two graphs. Prove that any two simple connected graphs with n vertices, all of degree two are isomorphic. 2+3

3. (p) From the graph given below answer the following :



(i) Write the degree of each vertex.

(ii) Which edges are incident with the vertex V_5 ?

(iii) Write the adjacent vertices of V_5.

(iv) Is the graph simple ? Why ? 1+1+1+2

(q) In a graph G there exists a path from the vertex u to the vertex v iff there exists a walk from u to v. 5

UNIT—II

4. (a) Prove that following statements are equivalent :

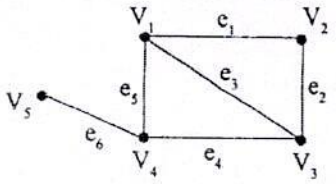
(i) There is exactly one path between every pair of vertices in G.

(ii) G is minimally connected graph. 5

(b) Define : (i) Binary tree, (ii) Rooted tree. Show that there are $(n + 1)/2$ number of pendent vertices in a binary tree with n vertices. 2+3

5. (p) Define eccentricity of a vertex. Show that every tree has either one or two centres. 1+4

(q) Define spanning tree and find out all possible spanning trees of the following graph. 1+4

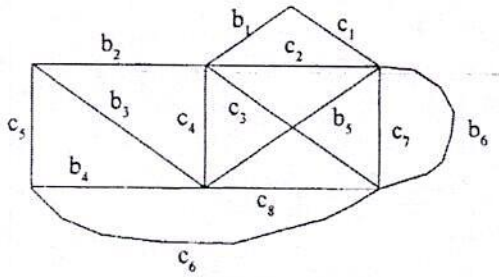


UNIT—III

6. (a) Define planar graph. If G is planar graph with n vertices, e edges, f faces and k components then prove that $n - e + f = k + 1$. 1+4

(b) Prove that every cutset in a connected graph G must contain at least one branch of every spanning tree of a graph G. 5

7. (p) Define fundamental circuits for the following graph G, find rank of G, nullity of G and fundamental circuits with reference to the spanning tree : $T = \{b_1, b_2, b_3, b_4, b_5, b_6\}$. 1+4



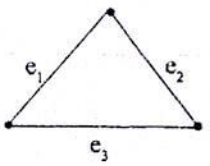
Graph G

(q) Show that Kuratowski's $K_{3,3}$ graph is non-planar. 5

UNIT—IV

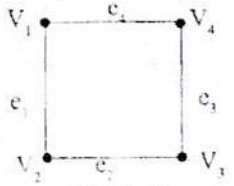
8. (a) Prove that in the vector space of a graph the circuit subspace and cutset subspace are orthogonal to each other. 5

(b) For a graph G with spanning tree $T = \{e_1, e_2\}$ find W_G, W_S, W_Γ, $W_\Gamma \cap W_S$ and $W_\Gamma \cup W_S$. 5



9. (p) Prove that the set W_Γ of all circuit vectors including zero vector in W_G form a subspace of W_G. 5

(q) Let G be a graph given as in figure. Find W_T, W_S, $W_T \cap W_S$ and $W_T \cap W_S$ where W_T is a circuit subspace and W_S is a cutset subspace. 5

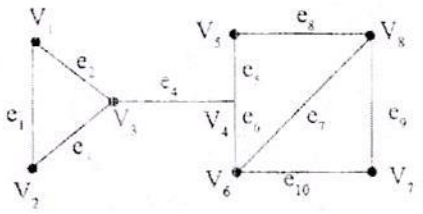


Group G

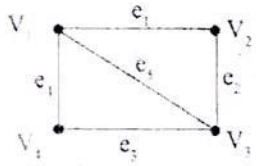
UNIT—V

10. (a) Prove that the reduced incidence matrix of graph is non-singular iff the graph is a tree. 5

(b) Define circuit matrix. Find the circuit matrix of the graph. 1+4

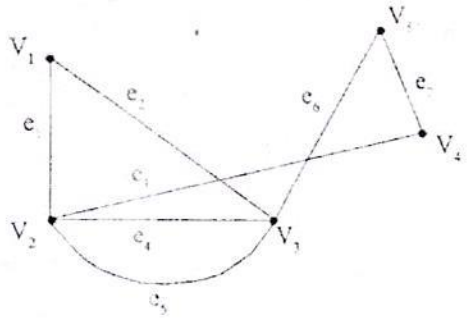


11. (p) Find incidence matrix A(G), circuit matrix B(G) and show that $AB^T = 0$, for the following graph 5



Graph G

(q) Define the Adjacency matrix. Find the Adjacency matrix of the following graph. 1+4



Sant Gadge Baba Amravati University, Amravati

The Berar General Education Society's

Sitabai Arts, Commerce and Science College, Akola

Preliminary Examination-2017-18

Class- B. Sc. I (II Sem)

Subject- Chemistry

Time- Three Hours **Total Marks: 80**

1. (A) Fill in the blanks: **2M**

(i) The shape of IF_3 molecule is ----------

(ii)The tendency of an anion to get polarize by cation is known as ----------

(iii) Water is regarded as an---------- solvents.

(iv)Fluorides of carbon are collectively known as----------

(B) Choose correct option from the given alternatives: **2M**

(i) The outer shell electronic configuration of 17th (VII A) group elements is

(a) $ns^2 np^3$ (b) $ns^2 np^1$

(c) $ns^2 np^5$ (d) $ns^2 np^2$

(ii) Soft acid has one of the following oxidation states

(a) Zero (b) five

(c) three (d) seven

(iii) Flourides of carbon are collectively known as----------

(a) Flurocarbon (b) fullerenes

(c) fluxinal (d) pervoskite

(iv) The amount of energy required to remove most loosely bounded electron from isolated gaseous atom in a ground state is called as----------

(a) Ionization energy (b) electron affinity

(c) Oxidation energy (d) oxidation potential

(C) Answer the following in one sentences: **4M**

(i) What is electron affinity?

(ii) Define Energy of Activation.

(iii) What is Benzyne?

(iv) Define molecularity.

UNIT—I

2. (A) Discuss the structure of SF_6 on the basis of hybridization. 4

(B) Explain Polarization of anion by cation. 4

(C) Explain why AgI_2species is stable while AgF_2 is unstable. 4

OR

3. (P) what is dipole-dipole interaction? How does dipole-dipole interaction affect the properties of substance? 4

(Q) State and explain Pearson's HSAB principle. 4

(R) What is hybridization '? Explain the need of concept of hybridization. 4

UNIT—II

4. (A) Discuss the ionization energy of oxygen family elements. 4

(B) What are interhalogen compounds? Discuss the structure of ClF_3 4

(C) Explain Born-Haber cycle. 4

OR

5. (P) Discuss the electronic configuration of halogen family. 4

(Q) Explain the structure of XeF_6 molecule. 4

(R) Explain the merits and demerits of liquid ammonia as a solvent. 4

UNIT—III

6. (A) How will you prepare chlorobenzene from: 4

(i) Benzene

(ii) BDC?

(B) What happens when? 4

(i) Allyl chloride is heated with alcoholic KOH

(ii) Benzyl chloride is reacted with aq KOH?

(C) Explain the benzyne intermediate mechanism (elimination-addition mechanism) of aromatic nucleophilic substitution. 4

OR

7. (P) how will you prepare: 4

(i) Aniline from chlorobenzene

(ii) acrolein from glycerol ?

(Q) How will you prepare:

(i) Ethylene glycol from ethylene?

(ii) Triinitro glycerol from glycerol?

(R) Compare the reactivity of Chlorobenzene and benzyl chloride. **4**

UNIT—IV

8. (A) Explain: **4**

(i) Kolbe's Reaction

(ii) Williamson's synthesis.

(B) What happens when: **4**

(i) Phenol is reacted with acetic anhydride

(ii) Styrene is reacted with peroxy acid?

(C) Explain the acidic nature of Phenol. **4**

OR

9. (P) Explain the ring opening reaction of epoxide catalyzed by alkali. **4**

(Q) Complete the following: 4

(i) $CH_2 = CH_2 + RCOOOH \rightarrow ?$

(ii) $CH_3 - CH_2 - O - CH_2 - CH_3 + HI \rightarrow ?$

(R) Explain: 4

(i) Fries Rearrangement

(ii) Claisen Rearrangement.

Unit V

10. (A) Define: **4**

(i) Non-Polar molecules

(ii) Induced dipole moment.

(B) Describe Gouy's method to determine magnetic unstable susceptibility. **4**

(C) Differentiate between diamagnetism and paramagnetism. **4**

OR

11. (P) Describe the Refraction method for the determination **4**

(Q) Differentiate between paramagnetic and diamagnetic substances. **4**

(R) Define: **4**

(i) Curie point

(ii) Neel point.

UNIT—VI

12. (A) Define zero order reaction and give one example. **4**

(B) Derive integrated rate law equation for first order reaction. **4**

(C) A 20% solution of cane sugar is inverted by 0.5 N HCl at 25°C. The angle of rotation of cane sugar at various time intervals are given below, show that this is first order reaction:

Time (s)	0	72	368	460	680	∞
Rotation (degree)	+24.1	+21.4	+12.4	+10	+5.5	-10.7

OR

13. (P) Derive the integrated rate law equation for second order reaction with equal initial concentration of reactants. **4**

(Q) Describe Van't Hoff's differential method for the determination of order of reaction. **4**

(R) Discuss how Arrhenius equation is used to determine activation energy of the reaction. **4**

Sant Gadge Baba Amravati University, Amravati

The Berar General Education Society's

Sitabai Arts, Commerce and Science College, Akola

Preliminary Examination-2018-19

Class- B. Sc. I(II Sem)

Subject- Chemistry

Time- Three Hours **Total Marks: 80**

1. (A) Fill in the blanks: **2M**

(i) Soft acids have oxidation state----------.

(ii)Flourides of carbon are collectively known as----------.

(iii) ClF_3 has geometry----------.

(iv)----------bond has directional nature.

(B) Choose correct option from the given alternatives: **2M**

(i) The geometry ofXeO_4 is

(a) Linear (b) tetrahedral (c) square planer (d) trigonal bipyramidal

(ii) Which of the following elements can show -1, +1, +3, +5 and +7 oxidation states?

(a) Iodine (b) Sodium (c) Sulphur (d) Magnesium

(iii) Fluorine never show positive oxidation state because:

(a) It is most electronegative element (b) Its atomic radius is very small

(c) It is less reactive (d) It is nonmetal

(iv) The shape of PCl_5 molecule is:

(a) V shaped (b) tetrahedral (c) T shaped (d) trigonal bipyramidal

(C) Answer the following in one sentences: **4M**

(i) What are epoxides? (ii) Define polarization.

(iii) What is Zero order Reaction? (iv) What is Curie point?

UNIT I

2. (A) Discuss the structure of BCl_3 on the basis of hybridization. **4**

(B) What is SHAB Principle? How is it useful to predict the stability of complex? **4**

(C) Explain: **4**

(i) Dipole-Dipole interaction.

(ii) Ion-Dipole interaction.

3. (P) How is electronegativity related to, Hardness and Softness of acids? **4**

(Q) Explain Fajan's Rules with respect to large and highly charged anions. **4**

(R) Discuss the structure of BeF_2 4

Unit II

4. (A) Write the configurations of IIA group elements. 4

(B) Explain Born Haber cycle. 4

(C) Explain water as a Universal Solvent. 4

OR

5. (P) Write any two reactions of liquid ammonia. 4

(Q) Discuss the structure and bonding in XeF_4 molecule. 4

(R) Explain tire following: - 4

(i) Dielectric constant.

(ii) Dipole moment.

Unit III

6. (A) Explain Benzyne intermediate mechanism of aromatic nucleophilic substitution. 4

(B) What happens when? 4

(i) Allyl chloride is treated with alcoholic KOH?

(ii) Glycol is reacted with PCl_5

(C) How will you prepare 4

(i) Ethylene glycol from ethylene?

(ii) Nitroglycerine from glycerol?

OR

7. (P) Explain the mechanism of Pinacol-Pinacolone rearrangement. 4

(Q) Chlorine in Vinyl chloride is less reactive towards nucleophilic substitution than that in allyl chloride. Explain why? 4

(R) How will you prepare 4

(i) Benyl chloride from toluene?

(ii) Allyl chloride from propene?

Unit IV

8. (A) Give the following reactions of Phenol: 4

(i) Kolbe's Reaction.

(ii) Fries Rearrangement.

(B) Explain Ring opening reaction of e0rylene oxide in presence of acid. 4

(C) How will you convert –? 4

(i) Diethyl ether to ethytiodide?

(ii) Aniline to phenol?

OR

9. (P) Explain the Acidic character of Phenol. 4

(Q) How wilt you prepare diethyl ether from – 4

(i) Ethyl bromide?

(ii) Ethyl alcohol?

(R) How will you prepare 4

(i) Ethylene oxide from ethylene?

(ii) Styrene oxide from styrene?

UNIT - V

10. (A) Define: (i) Polar molecule. (ii) Induced Polarization 4

(B) Explain the effect of temperature on magnetic susceptibility of diamagnetic, paramagnetic. Ferromagnetic and antiferromagnetic substances. 4

(C) What are paramagnetic substances? Give their characteristics. 4

OR

11. (P) If the magnetic moment of the substance is 6.9 B. M., calculate number of unpaired electrons.

(Q) Discuss Gouy's balance method for determination of molar magnetic susceptibility. 4

(R) Define: (i) Orientation polarization. (ii) Dipole moment.

UNIT – VI

12. (A) Define: (i) Rate constant. (ii) Molecularity. 4

(B) Describe Ostwald's isolation method for the determination of order of the reaction. 4

(C) Show that half-life period of first order reaction is independent of initial concentration of the reactant. 4

OR

13. (P) Define - (i) Order of the reaction. (ii) Activation energy. (iii) Pseudo first order reaction 4

(Q) Write Arrhenius equation for effect of temperature on the rate constant. 4

(R) Describe Graphical method for the determination of order of the reaction 4

Sant Gadge Baba Amravati University, Amravati

The Berar General Education Society`s

Sitabai Arts, Commerce and Science College, Akola

Preliminary Examination-2021-22

Class- B. Sc. I (II Sem)

Subject- Chemistry

Time- Three Hours **Total Marks: 80**

(A) Fill in the blanks: 2

(i) Fluorine is a _____ oxidizing agent than Chlorine.

(ii) Cumene is_____ benzene.

(iii) Rate constant is equal to the rate of reaction when the concentration of each of the reactants is_____

(iv) _____is a universal solvent.

(B) Choose the correct alternatives:- 2

(i) The Williamson's ether synthesis produces ether by reacting an:

(a) Alcohol with a metal (b) alkoxide with a metal

(c) alkoxide with alkyl halide (d) alkyl halide with aa aldehyde

(ii) What is the shape of XeO_4 molecule?

(a) Square Planer (b) Pyramidal (c) Tetrahedral (d) Linear

(iii) Chlorobenzene is an example of:

(a) Alkyl halide (b) alkenyl halide (c) aryl halide (d) halo alkane

(iv) Which of the following does not have permanent dipole moment?

(a) CH_3Cl (b) CO_2 (c) HCI (d) $C_6H_5NO_2$

(C) Answer in one sentence: - 4

(i) What is first order reaction?

(ii) De6ne Curie temperature.

(iii) Write the reaction between molar susceptibility and specific susceptibility.

(iv) What is polarizing power?

UNTT_I

1. (A) Explain:- 4

(i) $CaCl_2$ is readily soluble but Agcl is sparingly soluble is water.

(ii) Why melting point of NaCl is higher than CuCl ?

(B) What is sp_3d_2 hybridization? Discuss the structure of SF_6 molecule. 4

(C) What is SHAB principle? Discuss its any two applications. 4

OR

(P) What is polarization? Explain the polarization of the anion by the cation. 4

(Q) What is hybridization? Explain sp^2 hybridization with suitable example. 4

(R) Explain acid and base in terms of Franklin theory--Theory of solvent system. 4

UNIT—II

4. (A) Give properties and uses of fluorocarbon. 4

(B) Write the electronic configuration of oxygen family elements. 4

(C) Discuss the structure and bonding in XeF_2. 4

OR

5. (P) Discuss the trend of ionization energy of Halogen family elements. 4

(Q) Explain the structure of XeO_4 molecule. 4

(R) Discuss the following reaction in liquid Ammonia giving example :

(i) Neutralization

(ii) Solvolysis. 2+2=4

UNIT—III

6. (A) What happens when :

(i) Vinyl Chloride is heated with alcoholic KOH

(ii) Glycerol is treated with PCl_5. 2+2=4

(B) How will you convert :

(i) Ethylene Glycol to acetaldehyde.

(ii) Benzyl Chloride to benzyl amine. 2+2=4

(C) How will you prepare :

(i) Chlorobenzene from benzene

(ii) Benzyl Chloride from benzyl alcohol. 2+2=4

OR

7. (P) What is the action of following reagent on ethylene glycol :

(i) Sodium metal

(ii) Acetic acid. 2+2=4

(Q) How will you prepare :

(i) Vinyl Chloride from acetylene

(ii) Allyl Chloride from propene. 2+2=4

(R) Explain the mechanism of Pinacol-pinacolone rearrangement. 4

UNIT—IV

8. (A) What are dihydric and trihydric phenols ? Give all the isomers dihydric and trihydric phenol. 4

(B) Explain :

(i) Fries Rearrangement

(ii) Claisen Rearrangement. 2+2=4

(C) What is symmetrical ether ? Discuss continuous etherification process. 4

OR

9. (P) How will you prepare :

(Q) Explain :—

(i) Kolbe's Reaction

(ii) Reimer- Timer Reaction. 2+2=4

(R) Explain ring opening reaction of styrene oxide catalysed by acid. 4

UNIT—V

10. (A) Define :—

(i) Dipole moment.

(ii) Molar magnetic susceptibility. 2+2=4

(B) What is polar molecule ? Discuss in detail orientation polarization. 4

(C) Give the application of magnetic measurement for molecular structure determination. 4

OR

11. (P) Derive the relationship between magnetic moment and number of unpaired electrons. 4

(Q) Discuss Gouy's balance method for the determination of molar magnetic susceptibility of a substance. 4

(R) Define specific magnetic susceptibility. Find the specific magnetic susceptibility if the molar magnetic susceptibility of H_2O at 298 K is -13.0×10^{-12} $m^3.mol^{-1}$. 4

UNIT—VI

12. (A) What is zero order reaction ? Show that half life of zero order reaction is directly proportional to initial concentration of reactant. 4

(B) Explain :—

(i) Integration method for determination of order of reaction.

(ii) Pseudo-order reaction. 2+2=4

(C) How will you determine energy of Activation from Arrhenius equation at two different temperature ? 4

OR

13. (P) Define :—

(i) Half-life of a reaction

(ii) Molecularity. 2+2=4

(Q) Describe equifractional change method for determination of order of reaction. 4

(R) Trichloroacetic acid in aniline solvent decomposes to give chloroform and carbon dioxide. The rate constant for first order reaction is 4.0×10^{-5} min^{-1} at 25°C and 8.0×10^{-4} min^{-1} at 45°C. Calculate energy of activation for this reaction. (R=8.314 $JK^{-1}mol^{-1}$) 4

Sant Gadge Baba Amravati University, Amravati

The Berar General Education Society's
Sitabai Arts, Commerce and Science College,
Preliminary Examination-2017-18
Class- B. Sc. II (IV Sem)
Subject- Chemistry

Time : Three Hours] [Maximum Marks : 80

Note :— (1) Question No. 1 is compulsory.
(2) Solve ONE question from each unit.
(3) Draw diagram and give equation wherever necessary.
(4) Use of calculator is allowed.

1. (A) Fill in the blanks :— 2

(i) Elements lying between s and p block elements are known as _____.

(ii) The pH at which the amino acids in the solution has zero charge is _____.

(iii) Unit cell of NaCl contains _____ molecules of NaCl.

(iv) The presence of solute _____ the boiling point of the solvent.

(B) Choose the correct option from the given alternatives :— 2

(i) Zinc exhibits _____ oxidation state.

(a) +1 (b) −2

(c) +3 (d) +4

(ii) Acetoacetic ester on reaction with urea gives _____.

(a) 4-methyl uracyl (b) Malonyl urea

(c) Thiourea (d) Methyl urea

(iii) Aniline is _____ in nature.

(a) Acidic (b) Basic

(c) Neutral (d) Amphoteric

(iv) The total number of atoms per unit cell of Face centered cubic crystal (FCC) is _____.

(a) 1 (b) 2

(c) 3 (d) 4

(C) Answer the following in ONE sentence :- 4

(i) Define Ore.

(ii) Define Van't Hoff factor.

(iii) Define plane of symmetry.

(iv) What is reactive methylene group ?

UNIT—I

2. (A) Write the electronic configuration of 3d series elements. 4

(B) Give general characteristics of Transition elements. 4

(C) Which of the following ions are paramagnetic or diamagnetic ?

(i) Cu^{2} (ii) Mn^{+} (iii) Ni^{2} (iv) Co^{2} 4

OR

3. (P) Calculate the magnetic moment of following ions of transition series :

(i) Ti^{2} (ii) Cr^{3} (iii) Fe^{3} 6

(Q) What are minerals ? 2

(R) Explain the catalytic property of 3d series elements. 4

UNIT—II

4. (A) What is Lanthanide contraction ? What are its causes ? 4

(B) Write electronic configuration of Actinides. 4

(C) Explain Froth Floatation method. 4

OR

5. (P) Explain Magnetic separation method for the concentration of ore. 4

(Q) Discuss Ion Exchange method for the separation of Lanthanides. 4

(R) Define :

(i) Calcination (ii) Roasting. 4

UNIT—III

6. (A) Discuss open chain structure of Glucose. 4

(B) Explain molecular orbital structure of Naphthalene. 4

(C) How will you convert acetoacetic ester into

(i) Acetic acid (ii) Succinic acid ? 4

OR

7. (P) How will you prepare :

(i) α-naphthyl amine from α-naphthol

(ii) α-naphthol from α-naphthalene sulphonic acid ? 4

(Q) How will you prepare following from naphthalene :

(i) 1-acetylnaphthalene

(ii) 1-chloromethyl naphthalene ? 4

(R) Write short note on Epimerization. 2

(S) How will you convert Glucose into Fructose ? 2

UNIT—IV

8. (A) Discuss the diazotization reaction with its any two synthetic applications. 4

(B) How will you prepare following from aniline :

(i) ortho and para bromoaniline (ii) phenyl isocyanide ? 4

(C) Write short notes on :

(i) Isoelectric point (ii) Strecker synthesis for amino acids. 4

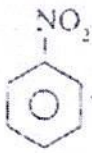
OR

9. (P) How will you prepare :

(i) Benzene from Benzene diazonium chloride

(ii) 2, 4, 6 tribromoaniline from Aniline. 4

(Q) Complete the following Reactions :

(i)  $+ 6[H] \xrightarrow[NaOH/H_2O]{Zn\ dust} ?$

(ii) $C_6H_5N_2Cl + H_2O \xrightarrow{H^+\Delta} ? - ? + HCl$ 4

(R) Write short account on Gabriel Phthalimide synthesis. 4

UNIT—V

10. (A) Describe Cottrell's method for the determination of elevation of boiling point. 4

(B) Melting point of Camphor is 449.5 K. The melting point of solution containing 5.22×10^{-3} kg Campher and 3.86×10^{-5} kg of an unknown substance is 431.5 K. Calculate the molar mass of the unknown substance.

(K_f of camphor = 37.7 K kg mol^{-1}) 4

(C) Derive equation of Van't Hoff factor when the solute undergo Association. 4

OR

11. (P) Define :

(i) Van't Hoff factor (ii) Colligative properties. 4

(Q) Derive relation between depression of freezing point and molecular weight of solute. 4

(R) A solution containing 2.44×10^{-3} kg of solute dissolved in 75×10^{-3} kg of water boiled at 373.413 K. Calculate the molar mass of solute (K_b = 0.512 Kg mol^{-1}). 4

UNIT—VI

12. (A) Define :

(i) Unit cell (ii) Axis of symmetry. 4

(B) Describe the Bragg's spectrophotometer method for the determination of crystal structure. 4

(C) The first order reflection maxima was noted at 5.90° from 100 planes of SCC. Calculate the wavelength of X-rays if interplanar spacing was 0.282 nm. 4

OR

13. (P) Explain the structure of NaCl on the basis of X-ray diffraction. 4

(Q) Define :

(i) Space Lattice (ii) Centre of Symmetry 4

(R) Sodium has bcc lattice with density of 1×10^{3} kg^{-3} and molar mass 23×10^{-3} kg mol^{-1}, find out length of edge of its unit cell.

(Given $N_0 = 6.023 \times 10^{23}$). 4

Sant Gadge Baba Amravati University, Amravati

The Berar General Education Society's

Sitabai Arts, Commerce and Science College, Akola

Preliminary Examination-2018-19

Class- B. Sc. II (IV Sem)

Subject- Chemistry

Time : Three Hours] [Maximum Marks : 80

N.B. :— (1) Question No. 1 is compulsory.

(2) Solve **ONE** question from each unit.

(3) Draw diagrams and give equations wherever necessary.

(4) Use of calculator is allowed.

1. (A) Fill in the blanks :

(i) Common oxidation state of Lanthanide element is _____.

(ii) Carbohydrates are poly _____ aldehydes or ketones.

(iii) Unit cell of NaCl contains _____ molecules of NaCl.

(iv) Amino derivative of Naphthalene are called _____. 2

(B) Choose the correct option from the given alternative :

(i) Which of the following Actinide does not occur in nature ?

(a) Th (b) U

(c) Am (d) Pa

(ii) Malonic ester on condensation with urea gives :

(a) 4-methyl uracil (b) Thiourea

(c) Methyl urea (d) Malonyl urea

(iii) Which of the following is not a colligative property :

(a) Elevation of Boiling point (b) Boiling point

(c) Depression of Freezing point (d) Osmotic pressure

(iv) The number of atoms per unit cell in Body Centred Cubic Crystal (BCC) Lattice :

(a) 1 (b) 2

(c) 3 (d) 4 2

(C) Answer in one sentence :

(i) Define Van't Hoff Factor.

(ii) What is slag ?

(iii) What is isoelectric point ?

(iv) Define plane of symmetry. 4

UNIT—I

2. (A) Explain oxidation states of 3d series elements. 4

(B) Explain with suitable reason-why :

(i) Cu^{2+} ion is paramagnetic and Zn^{2+} ion is dimagnetic.

(ii) Transition elements cannot form ionic compound in higher oxidation state. 4

(C) Discuss thermal decomposition and displacement of one metal by another for the extraction of elements. 4

OR

3. (P) Give electronic configuration of :

(i) Zirconium (At No = 40)

(ii) Cadmium (At No = 48). 4

(Q) Which of the following ions of transition series are expected to be coloured ? Why ?

(i) Sc^{3+} (ii) Co^{2+}

(iii) Cr^{3+} (iv) Mn^{2+} 4

(R) Explain high temperature chemical reduction method and electrolytic reduction method for the extraction of elements. 4

UNIT—II

4. (A) What is lanthanide contraction ? Explain the effect of lanthanide contraction on Lanthanides and on Post Lanthanide elements. 4

(B) Give electronic configuration of Actinides. 4

(C) Write short account on smelting. 4

OR

5. (P) Discuss oxidation states in Lanthanide series. 4

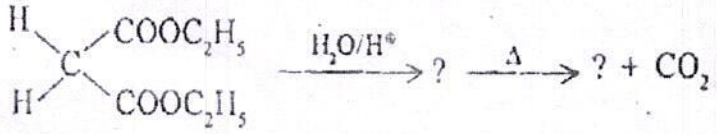
(Q) What is concentration of ore ? Explain gravity separation method for the concentration of ore. 4

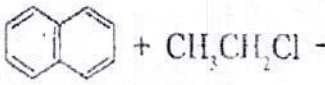
(R) Give electronic configuration of Lanthanide series elements. 4

UNIT—III

6. (A) What are polynuclear hydrocarbons ? Explain molecular orbital structure of Naphthalene. 4

(B) Complete the following reaction :

(i) 

(ii)  4

(C) What are epimers ? Explain the formation of D-Mannose from D-Glucose. 4

OR

7. (P) Discuss drawbacks of open chain structure of glucose and draw structures of α– and β – D – glucopyranose. 4

(Q) How will you convert :

(i) α – Naphthol to α – Naphthyl amine

(ii) Naphthalene to naphthalene sulphonic acid ? 4

(R) (i) How will you prepare succinic acid from malonic ester ? 2

(ii) What happens when naphthalene is heated with chlorine in presence of CCl_4 ? 2

UNIT—IV

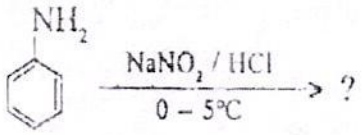
8. (A) What happens when aniline is treated with :

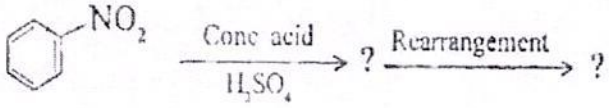
(i) aqueous Br_2

(ii) Br_2 in CS_2 ? 4

(B) Write short account on diazocoupling reaction of benzene diazonium chloride. 4

(C) Complete the following reactions :

(i) 

(ii)  4

OR

9. (P) Write short account on :

(i) Peptides

(ii) Zwitter ion. 4

(Q) How will you prepare following from aniline :

(i) Acetanilide

(ii) Benzanilide ? 4

(R) How will you obtain :

(i) Benzene N-methyl aniline from Aniline

(ii) Nitrobenzene from benzene ? 4

UNIT—V

10. (A) Derive an expression for the relationship between elevation of boiling point and molar mass of a non-volatile solute. 6

(B) A solution containing 2.44×10^{-3} kg of solute dissolved in 75×10^{-3} kg of water boiled at 373.413 K. Calculate the molar mass of solute ($K_b = 0.512$ kg mol $^{-1}$). 4

(C) Define depression in freezing point. 2

OR

11. (P) Describe Cottrell's method for the determination of elevation of boiling point. 4

(Q) Define Van't Hoff factor i ? Derive relationship between Van't Hoff factor i and degree of association. 4

(R) A solution of sucrose (molar mass = 342 gm mol^{-1}) is prepared by dissolving 68.4×10^{-3} kg in 1 kg of water. K_f for water is 1.86 K kg mol^{-1}. Find freezing point of the solution. 4

UNIT—VI

12. (A) Define :

    (i) Unit Cell

    (ii) Centre of symmetry. 4

    (B) Describe the Bragg's spectrophotometer method for the determination of crystal structure. 4

    (C) Calculate the glancing angle for first order reflection from 100 planes of FCC when X-rays of the wavelength of 0.154 nm are used. Given spacing of 100 planes is 0.315 nm. 4

OR

13. (P) Explain the structure of KCl on the basis of x-ray diffraction. 4

    (Q) Define :

    (i) Lattice point

    (ii) Axis of symmetry. 4

    (R) Find out Miller indices of Weiss indices of :

    (i) 2 : 1 : 3

    (ii) 1 : ∞ : 1/4. 4

Sant Gadge Baba Amravati University, Amravati

The Berar General Education Society's

Sitabai Arts, Commerce and Science College, Akola

Preliminary Examination-2021-22

Class- B. Sc. II (IV Sem)

Subject- Chemistry

Time : Three Hours] [Maximum Marks : 80

Note :— (1) All questions are compulsory.

(2) Question No. 1 carries 8 marks which each of the remaining questions carry 12 marks.

(3) Draw diagrams and write equations wherever necessary.

(4) Use of Scientific calculator is allowed.

1. (A) Fill in the blanks : ½×4=2

(i) _____ is the process in which ore heated in absence of air.

(ii) Malonic ester is also known as _____.

(iii) The property which depends on the number of particle of a substance is known as _____ property.

(iv) The NaCl crystal structure is a _____ cubic lattice.

(B) Select the correct alternative : ½×4=2

(i) The most stable oxidation state of iron is :

(a) +2 (b) +3

(c) −2 (d) −3

(ii) Galena is an ore of :

(a) Pb (b) Hg

(c) Sn (d) Zn

(iii) In Naphthalene, all the carbon atoms are present in hybridization :

(a) sp^3 (b) sp^2

(c) d^2sp^3 (d) sp

(iv) Which of the following is not a colligative property ?

(a) Elevation of boiling point (b) Boiling point

(c) Depression of freezing point (d) Osmotic pressure

(C) Answer in **ONE** sentence : 1×4=4

(i) What is an ore ?

(ii) Define the term, Axis of symmetry.

(iii) What is meant by smelting ?

(iv) What is meant by reactive methylene group ?

UNIT—I

2. (A) Describe the variable oxidation state of 3d series elements. 4

(B) Which of the following are paramagnetic and why ? 4

(a) Ni^{2+} (b) Ti^{3+}

(c) Sc^{3+} (d) Zn^{2+}

(C) Calculate the magnetic moment for the Mn^{+2} and Cr^{+3} ions. 4

OR

3. (P) What are the factors influencing the choice of extraction process ? 4

(Q) Explain the catalytic properties of 3d series elements. 4

(R) Explain, why copper and chromium show irregular configuration ? 4

UNIT—II

4. (A) Explain ion exchange method for separation of Lanthanides. 4

(B) Give the similarities between Lanthanides and Actinides Lutetium. 4

(C) Give the electronic configuration of Thorium, Uranium and Plutonium. 4

OR

5. (P) Give the difference between Calcination and Roasting. 4

(Q) Explain the oxidation state of Lanthanides. 4

(R) Explain the colour properties of Lanthanides series 4

UNIT—III

6. (A) How will you convert glucose into fructose ? 4

(B) Give the preparation of Malonic Ester from Acetic acid. 4

(C) Explain the electrophilic substitution reaction in Naphthalene. 4

OR

7. (P) Explain Epimerisation with example. 4

(Q) How will you prepare following from Aceto-acetic ester ? 4

(i) Acetyl Acetone

(ii) 4-Methyl uracil.

(R) How will you prepare α and β-Naphthylamines from naphthol ? 4

UNIT—IV

8. (A) How will you convert Benzene diazonium chloride into—

(i) Chlorobenzene and

(ii) Phenol ? 4

(B) Discuss the relative basic character of ammonia and aliphatic amines. 4

(C) Explain the terms : 4

(i) Zwitter ion

(ii) Isoelectric point.

OR

9. (P) Explain the various steps in Peptide synthesis. 4

(Q) How will you convert : 4

(i) Aniline to benzanilide

(ii) Aniline to benzene diazonium chloride ?

(R) Discuss the reduction of nitrobenzene in acidic and neutral medium. 4

UNIT—V

10. (A) Derive an expression for the relationship between depression of freezing point and molar mass of solute. 4

(B) Describe Rast method to determine depression in freezing point and molecular weight of solute. 4

(C) Find Molal Elevation constant of water which evaporates at 373 K with absorption of 40658 $J.mol^{-1}$ heat energy. (R = 8.314 J/K/mol) 4

OR

11. (P) Define the following terms : 4

(i) Molal Elevation constant

(ii) Van't Hoff factor.

(Q) Derive equation for the degree of dissociation, when the solute undergoes dissociation. 4

(R) A solution containing 2.44×10^{-3} kg of solute dissolved in 75×10^{-3} kg of water boiled at 373.413 K. Calculate Molar mass of solute. (K_b = 0.512 $kg.mol^{-1}$) 4

UNIT—VI

12. (A) Define the following terms : 4

(i) Unit cell

(ii) Plane of symmetry.

(B) Derive Bragg's equation for diffraction of X-rays by crystals. 4

(C) Calculate the glancing angle for first order reflection from 100 planes of FCC, X-ray of wavelength of 0.154 nm are used. Given spacing of 100 planes is 0.315 nm. 4

OR

13. (P) Explain how Bragg's method can be used to determine structure of NaCl. 4

(Q) Define the following : 4

(i) Law of Constancy of interfacial angles

(ii) Weiss indices.

(R) The interplanar distance for 301 planes was found to be 0.75 Å. Calculate length edge of its cubic lattice. 4

Sant Gadge Baba Amravati University, Amravati

The Berar General Education Society's
Sitabai Arts, Commerce and Science College, Akola
Preliminary Examination-2017-18
Class- B. Sc. III(VI Sem)
Subject- Chemistry

Time : Three Hours] [Maximum Marks : 80

Note :— (1) **ALL** questions are compulsory.
(2) Question No. 1 carries **8** marks while each of the remaining questions carry **12** marks each.
(3) Draw diagrams and write questions wherever necessary.
(4) Use of Scientific calculator is allowed.

1. (A) Fill in the blanks : 2

(i) As the charge on central metal ion increases, the stability of the complex _____.

(ii) Energy associated with each quantum or photon is proportional to _____.

(iii) Highest energy is required for _____ transition in UV spectroscopy.

(iv) Saturated Calomel electrode is commonly used as a _____.

(B) Select the correct alternative : 2

(i) Which of the following would not give singlet signal in NMR ?

(a) CH_3CH_3 (b) CH_3OCH_3

(c) CH_3COCH_3 (d) $CH_3CH_2OCH_2CH_3$

(ii) Which of the following spectroscopy would determine molecular weight of a compound ?

(a) UV-visible (b) NMR

(c) IR (d) Mass spectroscopy

(iii) Effective atomic number of Ni in $Ni(CO)_4$ is :

(a) 36 (b) 54

(c) 86 (d) 63

(iv) A nuclear reaction in which two or more lighter nuclei fuse together to form a heavier nucleus is called as :

(a) Nuclear fission reaction (b) Nuclear fusion reaction

(c) Thermonuclear reaction (d) Nuclear reaction

(C) Answer in one sentence : 4

(i) Define organometallic compounds.

(ii) What is coupling constant ?

(iii) Define hypsochromic shift.

(iv) What is endoergic reaction ?

UNIT—I

2. (A) Explain the term labile and inert complexes with suitable examples. 4

(B) How do charge and size of central metal ion affect the liability of complexes ? 4

(C) Differentiate between colorimeter and spectrophotometer. 4

OR

3. (P) Draw the block diagram of colorimeter and explain its components in brief. 4

(Q) How Cu^{+2} ion concentration is determined colorimetrically ? 4

(R) Explain the terms : 4

(i) Beer-Lambert's Law

(ii) Effect of size of ligands on stability of complexes.

UNIT—II

4. (A) Discuss the role of hemoglobin and myoglobin in oxygen transport process. 4

(B) What are silicones ? Give preparation of linear silicone polymer. 4

(C) Give one method of preparation of $Cr(CO)_6$. Explain its structure. 4

OR

5. (P) Explain how organometallic compounds are classified. 4

(Q) What happens when $(PNCl_2)_4$ reacts with (i) Ammonia, (ii) Methanol in presence of pyridine ? 4

(R) Explain the role of Mg^{+2} in biological process. What are its toxic effects ? 4

UNIT—III

6. (A) Identify the types of transitions in each of the following : 4

(i) $CH_3 - CH - Cl$

(ii) CH_3NH_2

(iii) $CH \equiv CH$

(iv) $CH_3CH_2CH_3$

(B) Calculate the number of vibrational modes in CO_2. Discuss it on the basis of IR spectrum. 4

(C) Define the following terms : 4

(i) Finger print region

(ii) Blue shift.

OR

7. (P) Which of the following vibrational modes are IR active or inactive ? 4

(i) Symmetric CO_2 stretching

(ii) Antisymmetric CO_2 stretching

(iii) Symmetric H_2O stretching

(iv) H_2O bending.

(Q) Distinguish the following molecule on the basis of U.V. spectroscopy :

Ethene and 1, 3-butadiene. 4

(R) Explain the following : 4

(i) Hypsochromic effect

(ii) Aromatic region in IR spectroscopy.

UNIT—IV

8. (A) Give the ideal relative intensities ratio for : 4

(i) a triplet

(ii) a quartet

(iii) a quintet

(iv) a doublet.

(B) Why is TMS selected as an internal standard reference in NMR spectroscopy ? 4

(C) Discuss the fragmentation of acetone. 4

OR

9. (P) How will you distinguish following pairs by their NMR spectra ? 4

(i) CH_3COCH_3 and CH_3COOH

(ii) $CH_3CH_2CH_2Br$ and $CH_3CHBrCH_3$

(Q) Give the structure of a compound C_3H_6O, whose mass spectrum shows m/z values of 15, 29, 31 and 46. 4

(R) Explain the following terms : 4

(i) Base peak

(ii) Shielding effect.

UNIT—V

10. (A) Explain photoelectric effect. 4

(B) Explain the postulates of Planck's quantum theory. 4

(C) Derive an expression for the energy of a free particle in one dimensional box. 4

OR

11. (P) Write note on deBroglie's hypothesis. 4

(Q) Define : 4

(i) Threshold frequency

(ii) Atomic orbital.

(R) What is the ground state energy of an electron in one dimensional box of width 1.0×10^{-10} m ? 4

UNIT—VI

12. (A) What are the advantages and disadvantages of Quinhydrone electrode ? 4

(B) Give any two applications of radioisotopes in (i) Bio-sciences, (ii) Industry. 2+2

(C) Define :

(i) Nuclear fusion

(ii) Indicator electrode. 4

OR

13. (P) Give the advantages and limitations of liquid drop model. 4

(Q) What is potentiometric titration ? How precipitation titration is performed potentiometrically ? 4

(R) Calculate the Q value of the following nuclear reaction :

$$^{27}_{13}Al + ^{4}_{2}He \longrightarrow ^{30}_{14}Si + ^{1}_{1}H$$

Given : mass of ^{27}Al = 26.9815 amu, mass of ^{4}He = 4.0026 amu, mass of ^{30}Si = 29.9738 amu and mass of ^{1}H = 1.0078 amu 4

Sant Gadge Baba Amravati University, Amravati

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Sitabai Arts, Commerce and Science College, Akola

Preliminary Examination-2018-19

Class- B. Sc. III(VI Sem)

Subject- Chemistry

Time : Three Hours] [Maximum Marks : 80

Note :— (1) ALL questions are compulsory.

(2) Question No. 1 carries 8 marks while each of the remaining questions carries 12 marks.

(3) Draw diagrams and write equations wherever necessary.

(4) Use of scientific calculator is allowed.

1. (A) Fill in the blanks : 2

(i) In the nickel carbonyl, the oxidation state of nickel is _____.

(ii) The peak corresponding to the most abundant ion in the mass spectrum of a compound is called _____.

(iii) The angular part of p-orbitals depends on zenith angle (0) and _____.

(iv) Electrochemistry is the branch of chemistry which deals with the interconversion of chemical energy and _____.

(B) Select the correct alternative : 2

(i) Heme is a porphyrin complex of :

(a) Fe (II) (b) Fe (III)

(c) Mg (II) (d) Zn (II)

(ii) How many NMR signals would be given by the compound $(CH_3)_2CHCH_2CH_3$?

(a) 3 (b) 4

(c) 5 (d) 2

(iii) Classical mechanics does not provide satisfactory explanation for :

(a) Black body radiation (b) Photoelectric effect

(c) Heat capacity of solid (d) All the above

(iv) Increase in the intensity of absorption in uv-visible spectrum is called :

(a) Hypsochromic shift (b) Bathochromic shift

(c) Hyperchromic shift (d) Hypochromic shift

(C) Answer in one sentence : 4

(i) What is paper chromatography ?

(ii) What is chemical shift ?

(iii) What are magic numbers ?

(iv) What is threshold frequency ?

UNIT—I

2. (A) Explain the nature of ligands affecting the stability of complexes. 4

(B) Draw the block diagram of spectrophotometer and explain its working. 4

(C) What is chromatography ? Explain the process of descending paper chromatography. 4

OR

3. (P) Explain the term labile and inert complexes with examples. 4

(Q) Explain SN^1 dissociative mechanism for octahedral complexes. 4

(R) What is R_f value ? What are the factors affecting it ? 4

UNIT—II

4. (A) Explain the structure of nickel tetracarbonyl on the basis of hybridization. 4

(B) Explain the role of Ca^{2+} ions in metabolic activities. 4

(C) What are inorganic polymers ? Give their classification on the basis of types of reactions. 4

OR

5. (P) Explain the nature of metal-carbon bond in carbonyls. 4

(Q) What is the action of following on iron pentacarbonyl :

(i) heat and

(ii) HCl ? 4

(R) What are silicones ? Give the preparation of linear silicone polymer. 4

UNIT—III

6. (A) Illustrate with diagram the different types of bending vibrations. 4

(B) Explain the different types of electronic transitions that occur in ultraviolet region with suitable diagram. 4

(C) Define the terms with suitable example :

(i) Auxochrome

(ii) Hypsochromic shift 4

OR

7. (P) Differentiate the following pairs of compounds on the basis of IR spectroscopy :

(i) Acetaldehyde and acetone

(ii) Acetamide and acetic acid. 4

(Q) What types of electronic transitions do you expect in each of the following ?

(i) $CH_3CH_2CH_2OH$

(ii) CH_3CN

(iii) $CH_3CH_2CH_3$

(iv) CH_3CH_2Br 4

(R) Arrange the following compounds in the increasing order of their λ_{max} values. Give reasons.

(i) Cyclohexatriene

(ii) Cyclohexane

(iii) 1, 3-cyclohexadiene 4

UNIT—IV

8. (A) Explain equivalent and non-equivalent protons with suitable example. 4

(B) How will you distinguish the following pairs of compounds by NMR spectra in high resolution ?

(i) $CH_3CH_2CH_2Br$ and $CH_3CHBrCH_3$

(ii) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-Br$ and $CH_3-CH(CH_3)-CH_2Br$ 4

(C) Calculate m/z value for each of the following :

(i) $[CH_3COCH_3]^+$

(ii) $[C_6H_5CHO]^+$ 4

OR

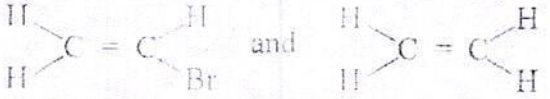
9. (P) Explain the terms :

(i) Molecular ion

(ii) Base peak. 4

(Q) How many peaks are observed in high resolution NMR spectra for methyl ethyl ether ($CH_3-O-CH_2-CH_3$) 4

(R) How will you distinguish the following pairs of compounds by NMR spectra ?

(i)  and

(ii) CH_3COCH_3 and CH_3CHO 4

UNIT—V

10. (A) State and explain Heisenberg's uncertainty principle. 4

(B) State and explain Compton's effect. 4

(C) What is the ground state energy of an electron in one dimensional box of width 1.0×10^{-10} m ?

(Given : $m = 9.1 \times 10^{-31}$ kg, $h = 6.626 \times 10^{-34}$ Js) 4

OR

11. (P) Derive Schrodinger's wave equation for one dimension. 4

(Q) Define :

(i) Photoelectric effect

(ii) Atomic orbitals. 4

(R) A particle having wavelength 6.6×10^{-10} m is moving with velocity 10^4 ms^{-1}. Find the mass of the particle. 4

UNIT—VI

12. (A) How is hydrogen electrode used for the determination of pH of the solution ? 4

(B) Define :

(i) Potentiometric titrations.

(ii) Concentration cells. $2 \times 2 = 4$

(C) Discuss the nuclear shell model. 4

OR

13. (P) Distinguish between nuclear fission and nuclear fusion reactions. 4

(Q) Give the applications of radioisotopes in :

(i) Agriculture

(ii) Medicine. 4

(R) What are the advantages and disadvantages of quinhydrone electrode ? 4

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The Berar General Education Society's

Sitabai Arts, Commerce and Science College, Akola

Practice Examination-2021-22

Class- B. Sc. III(VI Sem)

Subject- Chemistry

Time : Three Hours] [Maximum Marks : 80

Note :— (1) **ALL** questions are compulsory.

(2) Question No. 1 carries 8 marks while each of the remaining **SIX** questions carries 12 marks.

(3) Draw diagrams and write equations wherever necessary.

(4) Use of scientific calculators is allowed.

1. (A) Fill in the blanks :

(i) According to quantum theory, the radiations consist of packets of energy called _____.

(ii) The range of finger print region is _____.

(iii) The elements which are absolutely necessary for life process in a very small amount are called as _____.

(iv) The complexes showing reaction within one minute, 1 M concentration and at room temperature are called as _____ complexes. 2

(B) Choose the correct alternative :

(i) The intermediate formed in SN^2 mechanism shows _____ geometry.

(a) Pentagonal (b) Trigonal

(c) Octahedral (d) Pentagonal bipyramidal

(ii) Expression for energy of a particle in one dimensional box is :

(a) $\frac{n^2h^2}{8ma^2}$ (b) $\frac{nh^2}{2ma^2}$

(c) $\frac{n^2h^2}{4ma^2}$ (d) $\frac{n^2h}{2ma^2}$

(iii) Number of NMR signals in propane is :

(a) Four (b) Three

(c) Two (d) One

(iv) Geometrical shape of $Cr(CO)_6$ molecule is :

(a) Linear (b) Octahedral

(c) Tetrahedral (d) Pentagonal bipyramidal 2

(C) Answer in ONE sentence : 4

(i) Define the term auxochrome.

(ii) What are phosphonitrilic polymers ?

(iii) What is Compton effect ?

(iv) What is potentiometric titration ?

UNIT—I

2. (a) Describe the procedure of colourimetric determination of concentration of Cu^{2+} ions. 4

(b) Explain SN^1-dissociative mechanism of substitution in octahedral complexes. 4

(c) Describe the process of descending chromatography. 4

OR

3. (p) What is Beer-Lambert's law ? Write its mechanical expression and limitations. 4

(q) Define labile and inert complexes with an example of each 4

(r) What is paper chromatography ? Write its applications. 4

UNIT—II

4. (a) Explain the structure of $Fe(CO)_5$ molecule on the basis of valence bond theory. 4

(b) How is phosphonitrilic chloride prepared from PCl_5 and NH_4Cl ? Give its reaction with ammonia. 4

(c) Explain the role of K^+ in biological activities. 4

OR

5. (p) What is the action of following on $Ni(CO)_4$: (i) Halogen and (ii) H_2SO_4 ? 4

(q) What happens when $(PNCl_2)_3$ reacts with :

(i) Alcohol

(ii) C_6H_6 ? 4

(r) Discuss the role of Ca^{2+} in metabolic activity. 4

UNIT—III

6. (a) Calculate the vibrational degrees of freedom for the following molecules in IR spectroscopy :

(i) CO_2

(ii) NH_3

(iii) Benzene

(iv) CH_4. 4

(b) Explain the following electronic transitions with suitable example :

(i) $\pi \rightarrow \pi^*$ 2

(ii) $n \rightarrow \sigma^*$ Transition. 2

(c) Explain the following terms with diagram :

(i) Scissoring

(ii) Twisting. 4

OR

7. (p) Explain the following terms :

(i) Hypsochromic shift

(ii) Hyperchromic effect. 4

(q) Differentiate the following pairs of compounds on the basis of IR spectroscopy :

(i) acetamide and acetic acid

(ii) acetone and ethanol. 4

(r) What types of electronic transitions do you expect in each of the following compounds ?

(i) CH_4

(ii) $CH_2 = CH_2$

(iii) CH_3–Cl

(iv) CH_3–CH = O 4

UNIT—IV

8. (a) How will you distinguish following pairs by their NMR spectra ?

(i) CH_3COCH_3 and CH_3CHO

(ii) CH_3OCH_3 and CH_3CH_2-OH 4

(b) Calculate m/z value of each of the following in Mass Spectroscopy :

(i) $[(CH_3)_2CH]^+$

(ii) $[CH_3–NH_2]^+$ 4

(c) Explain the following terms with an example :

(i) Spin-spin coupling

(ii) Chemical shift. 4

OR

9. (p) Explain in brief the principle of mass spectroscopy. 4

(q) Write the NMR signals shown by following compounds :

(i) Ethyl bromide

(ii) 1, 3-dichloropropane

(iii) Ethyl acetate

(iv) Isopropyl bromide. 4

(r) Calculate m/z values for each of the following molecular ions :

(i) $[C_6H_5–CH_3]^+$

(ii) $[CH_3–CH_2–OH]^+$ 4

UNIT—V

10. (a) Derive an expression for the energy of a free particle in one dimensional box. 4

(b) What do you understand by dual character of matter ? 4

(c) The work function of Cs metal is 2.14 eV. Calculate the kinetic energy and the speed of the electrons emitted when the metal is irradiated with light of wavelength 700 nm. 4

OR

11. (p) What is the physical significance of ψ and ψ^2 ? 4

(q) What is threshold frequency ? How is this frequency related to the work function ? 4

(r) An electron is confined in one dimensional box of width 4.0×10^{-10} m. Calculate its energy in the fourth energy level. 4

UNIT—VI

12. (a) Define :

(i) pKa of the weak acid

(ii) Concentration cell

(iii) Q-value

(iv) Nuclear fusion reactions 4

(b) How pH of the solution is determined using the hydrogen gas electrode ? 4

(c) Explain the nuclear force on the basis of meson theory. 4

OR

13. (p) Give any four evidences in favour of Magic numbers. 4

(q) Derive an equation for EMF of concentration cell without transference. 4

(r) (i) Give any two applications of radioisotopes in industry.

(ii) Give any two advantages of glass electrode. 4

Sant Gadge Baba Amravati University, Amravati
The Berar Education Society's
Sitabai Arts, Commerce and Science College Akola
Preliminary Examination- 2021
B. Sc I (Sem I)
Subject- ZOOLOGY
(Cell and Developmental Biology)

Time: 3 hrs Marks: 80

Note: All questions are compulsory. Draw neat well labelled diagram whenever necessary. Q.1. carry 8 marks and remaining questions carries 12 marks.

Q.1. A) Fill in the blanks:-

1. Amoebiasis is a caused by _____.
2. Locomotary organs in Asterias are _____.
3. Periplaneta is commonly known as _____.
4. Coelenterata is a group of animals having single central cavity known as ___.

B) Choose the correct alternative for the following statement:-

1) Trophozoite of plasmodium live in _____.
a) RBC b) Lymph c) Liver d) Blood
2) Metridium belongs to class _____.
1) Schyphooozoa 2) Anthozoa 3) Hydrozoa 4) Sporozoa
3) Saliva of leech contains an anticoagulant called _____.
1) Hg 2) Hirudin 3) Histamine 4) Heparin
4) Balanoglossus belongs to _____.
1) Hemichordata 2) Cephalochordata 3) Urochordata 4) Cyclostomata

C) Write answers in one sentence:-

1) What is the food of fasciola hepatica ?
2) What is coral reef ?
3) How many chambers of crop are present in leech?
4) Define incubation period of malaria parasite .

Q.2. Discribe the following:-

1) Economic importance coral reef.
2) Body organisation of Balanoglossus.
3) Physiological adaptationin Helminths.

OR

1) Bipinnaria larva.
2) Affinities of Balanaglossus with nonchordata.
3) Amphiblastula larva.

Q.3. Describe canal system and its significance in sycon.

OR

Explain habit habitat and external features of metridum.

Q. 4. Attempt the following:-

1) External features of fasciola hepatica.
2) Digestive system of ascaries.
3) Flame cell in fasciola hepatica.

OR

1) Excretory system of ascaris.
2) Digestive system of fasciola hepatica.
3) Male reproductive system of ascaris. (diagram only)

Q.5. Describe the digestive system in leech.

OR

Give an account of male reproductive organs of cockroach.

Q.6. Attempt the following:-

1) Female reproductive organ of pila.
2) Radula of pila.
3) Food and feeding in star fish.

OR

1) Ctenidium of pila
2) Tube feet of starfish.
3) Madreporite in starfish.

Q.7. Describe the following:-

1) Control of malaria.
2) General characters of phylum protozoa.
3) Sporozoite of plasmodium.

OR

4) Preerythrocytic schizogony.
5) Trypanosomiasis.
6) Symptoms of malaria.

Sant Gadge Baba Amravati University, Amravati
The Berar Education Society's
Sitabai Aets, Commerce and Science College Akola
Preliminary Examination- 2019
B. Sc I (Sem I)
Subject- ZOOLOGY
(Cell and Developmental Biology)

Time: 3 hrs Marks: 80

Note: All questions are compulsory. Draw neat well labelled diagram whenever necessary. Q.1. carry 8 marks and remaining questions carries 12 marks.

Q.1. A) Fill in the blanks:-

1. Amoebiasis is a caused by _____.
2. Locomotary organs in Asterias are _____.
3. Periplaneta is commonly known as _____.
4. Coelenterata is a group of animals having single central cavity known as ___.

B) Choose the correct alternative for the following statement:-

1) Trophozoite of plasmodium live in _____.
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3) Saliva of leech contains an anticoagulant called _____.
1) Hg 2) Hirudin 3) Histamine 4) Heparin
4) Balanoglossus belongs to _____.
1) Hemichordata 2) Cephalochordata 3) Urochordata 4) Cyclostomata

C) Write answers in one sentence:-

1) What is the food of fasciola hepatica ?
2) What is coral reef ?
3) How many chambers of crop are present in leech?
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Q.2. Discribe the following:-

1) Economic importance coral reef.
2) Body organisation of Balanoglossus.
3) Physiological adaptationin Helminths.

OR

1) Bipinnaria larva.
2) Affinities of Balanaglossus with nonchordata.
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Explain habit habitat and external features of metridum.

Q.4. Attempt the following:-

1) Female reproductive organ of pila.
2) Radula of pila.
3) Food and feeding in star fish.

OR

1) Ctenidium of pila
2) Tube feet of starfish.
3) Madreporite in starfish.

Q.5. Describe the digestive system in leech.

OR

Give an account of male reproductive organs of cockroach.

Q. 6. Attempt the following:-

1) External features of fasciola hepatica.
2) Digestive system of ascaries.
3) Flame cell in fasciola hepatica.

OR

1) Excretory system of ascaris.
2) Digestive system of fasciola hepatica.
3) Male reproductive system of ascaris. (Diagram only)

Q.7. Describe the following:-

1) Control of malaria.
2) General characters of phylum protozoa.
3) Sporozoite of plasmodium.

OR

4) Preerythrocytic schizogony.
5) Trypanosomiasis.
6) Symptoms of malaria.

Sant Gadge Baba Amravati University, Amravati
The Berar Education Society's
Sitabai Arts, Commerce and Science College Akola
Preliminary Examination- 2018
B. Sc I (Sem I)
Subject- ZOOLOGY
(Cell and Developmental Biology)

Time: 3 hrs Marks: 80

Note: All questions are compulsory. Draw neat well labelled diagram whenever necessary. Q.1. carry 8 marks and remaining questions carries 12 marks.

Q.1. A) Fill in the blanks:-

1. Amoebiasis is a caused by _____.
2. Locomotary organs in Asterias are _____.
3. Periplaneta is commonly known as _____.
4. Coelenterata is a group of animals having single central cavity known as ___.

B) Choose the correct alternative for the following statement:-

1) Trophozoite of plasmodium live in _____.
a) RBC b) Lymph c) Liver d) Blood
2) Metridium belongs to class _____.
1) Schyphooozoa 2) Anthozoa 3) Hydrozoa 4) Sporozoa
3) Saliva of leech contains an anticoagulant called _____.
1) Hg 2) Hirudin 3) Histamine 4) Heparin
4) Balanoglossus belongs to _____.
1) Hemichordata 2) Cephalochordata 3) Urochordata 4) Cyclostomata

C) Write answers in one sentence:-

1) What is the food of fasciola hepatica ?
2) What is coral reef ?
3) How many chambers of crop are present in leech?
4) Define incubation period of malaria parasite .

Q.2. Describe the following:-

1) Control of malaria.
2) General characters of phylum protozoa.
3) Sporozoite of plasmodium.

OR

4) Preerythrocytic schizogony.

5) Trypanosomiasis.

6) Symptoms of malaria.

Q.3. Describe canal system and its significance in sycon.

OR

Explain habit habitat and external features of metridum.

Q. 4. Attempt the following:-

1) External features of fasciola hepatica.

2) Digestive system of ascaries.

3) Flame cell in fasciola hepatica.

OR

1) Excretory system of ascaris.

2) Digestive system of fasciola hepatica.

3) Male reproductive system of ascaris. (diagram only)

Q.5. Describe the digestive system in leech.

OR

Give an account of male reproductive organs of cockroach.

Q.6. Attempt the following:-

1) Female reproductive organ of pila.

2) Radula of pila.

3) Food and feeding in star fish.

OR

1) Ctenidium of pila

2) Tube feet of starfish.

3) Madreporite in starfish.

Q.7. Discribe the following:-

1) Economic importance coral reef.

2) Body organisation of Balanoglossus.

3) Physiological adaptationin Helminths.

OR

1) Bipinnaria larva.

2) Affinities of Balanaglossus with nonchordata.

3) Amphiblastula larva.

Sant Gadge Baba Amravati University, Amravati
The Berar Education Society's
Sitabai Arts, Commerce and Science College Akola
Preliminary Examination- 2017
B.Sc I (Sem I)
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(Cell and Developmental Biology)

Time: 3 hrs. Marks: 80

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Sant Gadge Baba Amravati University, Amravati
The Berar Education Society
Sitabai Arts, Commerce, Science College Akola
Preliminary Examination 2021
B.Sc. II (Sem III) Subject Zoology

(Life and Diversity of Chordata and Concept of Evolution)

Time : Three Hours Marks : 80

Note : (1) All queshtions are compulsory.

(2) Question No. 1 Carries 8 marks and remaining questions carry 12 marks each

(3) Draw well labelled diagrams wherever necessary.

1 (a) Fill in the blanks. **04 M**

1) Exeretory organs of amphioxus are called ----------

2) Random fluctuation in gene frequency is called as ----------

3) The theory of Natural selection was proposed by ----------

4) Frog has ---------- chambered heart.

(b) Choose the correct alternatives **2 M**

5) Liver of scoliodon is :

A) Single lobed B) Bilobed

C) Tri lobed D) Four lobed

6) Flippers of whale and forelimbs of man are :

A) Vestigial organs B) Carbon 15

C) Carbon 14 D) None of these

8) ---------- is a connecting link between Annelida and Arthropoda.

A) Peripatus B) Platypus

C) Caterpillar D) Archaeopteryx

C) Answer in one Sentence each **2 M**

9) What is Allopatric speciation?

10) Who proposed "Biogenetic Law"?

11) Which is the sound producing organ in birds?

12) Define gene pool.

2. Describe the digestive system of Scoliodon. **12 M**

OR

Describe the external features of amphioxus.

3. Describe the following : **12 M**

a) External features of Rana tigrina.

b) Internal structure of Heart of Calotes (labelled diagram only)

c) Parental care in Ampliibia through formation of nests.

OR

d) Unnogenital system of female Calotes.

e) Internal structure of heart of frog (labelled diagram only)

f) Snake venom.

4. Describe migration in birds. **12 M**

OR

Describe salirent features of prototheria and Metatheria.

5. Attempt the following. **12 M**

g) Recapitulation and Biogenetic Law.

h) Conditions for fossilization

i) Homologous Organs.

OR

j) Casts and mould

k) Archaeopteryx as connecting link.

l) Radioactive carbon dating.

6. Explain the following **12 M**

m) Darwinism

n) Allopatric speciation

o) Genetic drift.

OR

p) Hardy Weinberg law

q) Convergent Evolution

r) Lamarckism.

7. Describe the following **12 M**

s) Dryopithecus

t) Aortic Arches in fishes

u) Aquatic Adaptations.

OR

v) Neandeithal man

w) Desert adaptaions

x) Australopithecus.

Sant Gadge Baba Amravati University, Amravati
The Berar Education Society
Sitabai Arts, Commerce, Science College Akola
Preliminary Examination 2020
B.Sc. II (Sem III) Subject Zoology
(Life and Diversity of Chordata and Concept of Evolution)

Time : Three Hours Marks : 80

Note : (1) All queshtions are compulsory.

(2) Question No. 1 Carries 8 marks and remaining Six questions carry 12 marks each

(3) Illustrate your answars with stitable diagrams wherever necessary.

1 (a) Fill in the blanks. **02 M**

1) The characteristic sound made by frog is known as ----------

2) ---------- are vestigial structure in Horse.

3) ---------- is connecting link between annelida and arthropoda.

4) Summer sleep of Frog is called as ----------

(b) Choose correct alternative from the following. **2 M**

v) Viper venom is ----------

A) Neurotoxic B) Non-poisonous C) Haemotoxic D) None of above

vi) Insulin is a ----------

A) Vitimin B) Lipid

C) Hormone D) Enzyme

vii) Kidney of an adult mommal is ----------

A) Pronephros B) Mesonephros

C) Opithonephros D) Metanephros

viii) Marsupial found only in Australia is ----------

A) Opossum B) Kangroo

C) Bandicoots D) Wombat

C) Answer in one Sentence.. **4 M**

ix) How many lobes are present in liver of scoliodan?

x) What is migration in animals?

xi) What is difference between endocrine gland and exocrine gland?

xii) What type of skull is found in Apes?

2. Describe the structure and working of heart of scoliodon. **12 M**

OR

Describe the Digestive System of Amphioxus.

3. Explain the following : **12 M**

a) Parental care in Amphibin (any one example)

b) Srtake venom.

c) Uninogenital System in male Rana tigrina (Diagram Only)

OR

d) External features of Frog (Diagram only)

e) Make uninogenital system of Calotes.

f) External features of heart of frog.

4. Describe the respiratory system in pigeon. **12 M**

OR

Describe the salient features of Prototheria.

5. Explain the following. **12 M**

g) Biochemical evidences of evolution.

h) Areheopteryx as connecting link.

i) Radiogetive earhon dating of fossils.

OR

j) Importance of fossil record.

k) Analegous and homologous organs

l) Fossilization.

6. Explain the following **12 M**

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n) Divergent evolution

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OR

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s) Modern man

t) Aortic arches in birds

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Sant Gadge Baba Amravati University, Amravati
The Berar Education Society
Sitabai Arts, Commerce, Science College Akola
Preliminary Examination 2019
B.Sc. II (Sem III) Subject Zoology
(Life and Diversity of Chordata and Concept of Evolution)

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Sant Gadge Baba Amravati University, Amravati
The Berar Education Society
Sitabai Arts, Commerce, Science College Akola
Preliminary Examination 2018
B.Sc. II (Sem III) Subject Zoology
(Life and Diversity of Chordata and Concept of Evolution)

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Sant Gadge Baba Amravati University, Amravati
The Berar Education Society
Sitabai Arts, Commerce, Science College Akola
Preliminary Examination 2017
B.Sc. II (Sem III) Subject Zoology
(Life and Diversity of Chordata and Concept of Evolution)

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Sant Gadge Baba Amravati University , Amravati

The Berar Education Society's

Sitabai Arts ,Commerce and Science College Akola

Preliminary Examination -2021

B.Sc. III (Sem V)

Subject -ZOOLOGY

(Animal Physiology and Economic Zoology)

Time: Three Hours **Maximum Marks:80**

Note (1) ALL questions are compulsory

(2) Question No. 1 carries 8 marks and remaining SIX questions carry 12 marks each

(3) Illustrate your answers with suitable diagrams wherever necessary.

Q.1. (A) Fill in the blanks:

(i) The deficiency of thyroxin in the adults causes-------

(ii) Animals which excrete urea are called------

(iii) ------- is a junction between neuron and muscle.

(iv) Cirrhinus mrigala is commonly called as------

(B) Choose correct alternative from the following:

(v) The cardiac cycle time in human being is :

(a) 1 second

(b) 0.5 second

(c) 0.8 second

(d) 1.1 second

(vi) Walls of the following do not posses smooth muscles:

(a) Heart. (b) Veins

(c) Intestine. (d) Urinary bladder

(vii) Serotonin is a:

(a) Enzyme. (b) Vitamin

(c) Hormone. (d) Neurotransmitter

(viii) The corpus luteum secretes large quantity of hormone:

(a) Estrogen. (b) Progesterone

(c) Prolactin. (d) Oxytocin

(C) Answer in one sentence each:

(ix) Define Rigor mortis.

(x) Which is the smallest unit of lung?

(xi) Which reptile is efficient in keeping the number of rodents andinsectsin

(xii) What is induced breeding?

Q.2 . Explain various respiratory pigments and their functions.

OR

Give the detailed account of composition and functions of blood. 12M.

Q.3. Attempt the following:

(a) Muscle twitch.

(b) Actin

(c) Neuromuscular junction (diagram only).

OR

(d) Isometric and isotonic contraction.

(e) Tetanus

(f) All or none law. 12M.

Q 4 Give an account:

(g) E.M. structure of Neuron

(h) Osteoporosis

(i) Synaptic transmission

OR

(i) Gonadotropins

(k) GABA

(l) Hormones of adrenal gland cortex. 12M.

Q.5. Describe various types of placenta on the basis of distribution of chorionic villi.

OR

Explain variety of mechanisms and adaptations of thermoregulation in vertebrates. 12M.

Q 6. Attempt the following:

(m) Control of stored food grain pests

(n) Economic importance of bats

(0) Rearing of silkworms

OR

(p) Importance of ladybugs

(q) Damage and control of spotted bollworm

(r) Products of apiculture. 12M.

Q 7. Attempt the following:

(s) Cage culture

(t) Hypophysation

(u) Inorganic fertilizers

OR

(v) Modern drugs used in fish breeding

(w) Polyculture

(x) Fish products and by-products. 12M.

Sant Gadge Baba Amravati University , Amravati

The Berar Education Society's

Sitabai Arts ,Commerce and Science College Akola

Preliminary Examination -2019

B.Sc. III (Sem V)

Subject -ZOOLOGY

(Animal Physiology and Economic Zoology)

Time: Three Hours **Maximum Marks:80**

Note:

(1) All questions are compulsory.

(2) Question No One carries Eight marks and remaining six questions carry Twelve marks each.

(3) II Illustrate your answer with suitable diagram (wherever necessary. (2)

Q1. (a) Fill in the blanks

(i) Heart beat is initiated by -------

(ii) Diabetes mellitus is caused by deficiency of --------

(iii) The dark line present in the center of "I' band (light band) of muscle is called line --------

(iv) Panting is a method of -------

(b) Choose correct alternative from the following

(v) Which one is bottom dweller fish.

(a) Mrigal. (b) Catla

(c) Lamprey. (d) Dolphin.

(vi) The most toxic excretory product is ---------

(a) CO_2. (b) Amino acids

(c) NH3 (d) Urea

(vii) Muscle get fatigue due to accumulation of-------

(a) Lactic acid (b) ATP

(c) Mg cofactor. (d) Sodium.

(Viii) Atrial systole in man is completed in---------

(a) 0.5 sec. (b) 0.3 sec

(c) 0.1 sec. (d) 0.8 sec.

(c) Answer in one sentence.

(ix) Which vein carries oxygenated blood ?

(x) What is Nissl's granule ?

(xi) What is secretion of corpus luteum ?

(xii) What is ovaprim?

Q.2. Explain the following:-

(a) Haemoglobin.

(b) Pace maker.

(c) ABO blood groups.

OR

(d) Hamocyanin.

(e) Valves of heart.

(f) Functions of blood. 12M

Q.3. Describe the following:-

(g) Sarcomere.

(h) Cardiac muscle.

(i) Rigor mortis.

OR

(j) Tetanus.

(k) Neuromuscular junction.

(l) Unstriated muscle (smooth muscle). 12M.

Q.4. Give an account of hormones of Thyroid gland and their roles.

OR

Give an account of neurotransmitters. 12M.

Q 5. Attempt the following

(m) Poikilotherms.

(n) Luteal phase.

(0) Endocrine functions of placenta.

OR 12M.

(p) Homeotherms.

(q) Menstrual phase.

(r) Osmoregulation in push water fishes.

Q 6 Explain the following 12M.

(s) Pest of Jowar (any one).

(t) Economic importance of rodents.

(u) Importance of spider.

OR

(v) Pest of cotton (any one).

(w) Economic importance of bat.

(x) Beneficial insect-lady bug. 12M.

Q 7. Describe the Chinese circular hatchery unit.

OR

Describe induced breeding by hypophysation method. 12M

Sant Gadge Baba Amravati University , Amravati

The Berar Education Society's

Sitabai Arts ,Commerce and Science College Akola

Preliminary Examination -2018

B.Sc. III (Sem V)

Subject -ZOOLOGY

(Animal Physiology and Economic Zoology)

Time: Three Hours **Maximum Marks:80**

Note (1) ALL questions are compulsory

(2) Question No. 1 carries 8 marks and remaining SIX questions carry 12 marks each

(3) Illustrate your answers with suitable diagrams wherever necessary.

1. (A) Fill in the blanks:

(i) The blood of crustaceans contains respiratory pigment-------

(ii) When Ca" binds the troponin then ----- removed from actin filament.

(iii) The warm blooded animals are called as------

(iv) The removal of pituitary gland from the fish is called as------

(B) Choose correct alternative from the following:

(v) The raptorial legs are present in:

(a) Spider. (b) Mantis

(c) Lady bugs. (d) Soldier beetle

(vi) Which of the following glands contains B cells:

(a) Pituitary. (b) Thyroid

(c) Adrenal. (d) Islets of Langerhans

(vii) Fish fry (fries) are kept in:

(a) Nursery pond. (b) Rearing pond

(c) Stocking pond. (d) Breeding pond.

(viii) Each haemoglobin molecule carries:

(a) 1 molecule of O, (b) 2 molecules of O,.

(c) 3 molecules of 0, (d) 4 molecules of O,.

(C) Answer in one sentence:

(ix) What is sarcomere?

(x) What is synapse?

(xi) What is thermoregulation?

(xii) What is polyculture?

Q.2. Attempt the following:

(a) Structure of lung

(b) Haemoglobin

(c) Functions of blood.

OR 12 M.

(d) Structure of Gill

(e) Hemocyanin

(f) Blood plasma.

Q 3. Describe structure of Neuromuscular junction.

OR 12M.

Describe muscle contraction by sliding filament theory.

Q 4. Describe E.M. structure of Neuron.

OR

Describe synapse and synaptic transmission. 12M.

Q 5. Give an account on:

(g) Proliferative phase

(h) Structure of mammalian placenta

(i) Ammonotelism.

OR 12 M.

(i) Estrous phase

(k) Hormonal control of reproduction in male

(1) Poikilothermic animals.

Q 6. Attempt the following:

(m) Economic importance of spider

(n) Pests of stored foodgrains

(0) Importance of Honey

OR 12 M.

(p) Soldier beetle

(q) Economic importance of snakes

(r) Importance of silk.

Q.7. Describe the following:

(s) Inorganic fertilizers

(t) Hypophysation

(u) Cage culture

OR 12 M.

(v) Chinese circular hatchery (working)

(w) Rearing pond

(x) Integrated aquaculture.

Sant Gadge Baba Amravati University , Amravati

The Berar Education Society's

Sitabai Arts ,Commerce and Science College Akola

Preliminary Examination -2018

B.Sc. III (Sem V)

Subject -ZOOLOGY

(Animal Physiology and Economic Zoology)

Time: Three Hours **Maximum Marks:80**

Note (1) ALL questions are compulsory

(2) Question No. 1 carries 8 marks and remaining SIX questions carry 12 marks each

(3) Illustrate your answers with suitable diagrams wherever necessary.

1. (A) Fill in the blanks:

(i) The blood of crustaceans contains respiratory pigment-------

(ii) When Ca" binds the troponin then ----- removed from actin filament.

(iii) The warm blooded animals are called as------

(iv) The removal of pituitary gland from the fish is called as------

(B) Choose correct alternative from the following:

(v) The raptorial legs are present in:

(a) Spider. (b) Mantis

(c) Lady bugs. (d) Soldier beetle

(vi) Which of the following glands contains B cells:

(a) Pituitary. (b) Thyroid

(c) Adrenal. (d) Islets of Langerhans

(vii) Fish fry (fries) are kept in:

(a) Nursery pond. (b) Rearing pond

(c) Stocking pond. (d) Breeding pond.

(viii) Each haemoglobin molecule carries:

(a) 1 molecule of O, (b) 2 molecules of O_2.

(c) 3 molecules of 0, (d) 4 molecules of O_2.

(C) Answer in one sentence:

(ix) What is sarcomere?

(x) What is synapse?

(xi) What is thermoregulation?

(xii) What is polyculture?

Q.2. Attempt the following:

(a) Structure of lung

(b) Haemoglobin

(c) Functions of blood.

OR 12 M.

(d) Structure of Gill

(e) Hemocyanin

(f) Blood plasma.

Q 3. Describe structure of Neuromuscular junction.

OR 12M.

Describe muscle contraction by sliding filament theory.

Q 4. Describe E.M. structure of Neuron.

OR

Describe synapse and synaptic transmission. 12M.

Q 5. Give an account on:

(g) Proliferative phase

(h) Structure of mammalian placenta

(i) Ammonotelism.

OR 12 M.

(i) Estrous phase

(k) Hormonal control of reproduction in male

(1) Poikilothermic animals.

Q 6. Attempt the following:

(m) Economic importance of spider

(n) Pests of stored foodgrains

(0) Importance of Honey

OR 12 M.

(p) Soldier beetle

(q) Economic importance of snakes

(r) Importance of silk.

Q.7. Describe the following:

(s) Inorganic fertilizers

(t) Hypophysation

(u) Cage culture

OR 12 M.

(v) Chinese circular hatchery (working)

(w) Rearing pond

(x) Integrated aquaculture.

Sant Gadge Baba Amravati University, Amravati
The Berar Education Society's
Sitabai Aets, Commerce and Science College Akola
Preliminary Examination- 2017
B.Sc I (Sem II)
Subject- ZOOLOGY
(Cell and Developmental Biology)

Time: 3 hrs **Marks: 80**

Note: All questions are compulsory. Draw neat well labelled diagram whenever nessary. Q.1. carry 8 marks and reamaining questions carries 12 marks.

Q 1 A) Fill in the blanks:-

1)The prokaryotic ribosomes are _____.

2) Lyosomes are also called as _____.

3) Division of cytoplasm is known as _____.

4) Lampbrush chromosomes occurs in _____.

B) Choose correct alternative from the following:-

1) Ingestion of liquid particles by a cell is called as _____.

a) phagocytosis b) pinocytosis

c) Lysis d) none of the above

2) Who discovered ribosomes in animal cell?

a) waston b) Tatum

c) Cowdy d) palade

3) The tip of chromosomes is called

a) Metamere b) chromomere

c) Micromere d) Telomere

4) In adult which ceii is used as stem cell?

a) Bone marrow cells b) Embryonic cell

c) Muscle cell d) None of the above

C) Answer in one sentence

1) What is cell division ?

2) Who discovered lysosomes?

3) What is spermatogenesis?

4) Who discovered cell?

Q.no.2. Explain the following:-

1) Structure of prokaryotic cell

2) Function of plasm membrane

3) Structure of Endoplasmic reticulum

OR

4) Structure of plasma membrane

5) Fluid Mosaic model of plasma membrane

6) Function of Endoplasmic reticulum

Q.3 Describe the following

1) Function of Golgi complex

2) ULtrastructure of ribosomes

3) Structure of mitochondria

OR

4) Structure of Golgi complex

5) Function of Ribosomes

6) Function of Lysosomes

Q.4 Describe the structure and function of nucleolus

OR

Describe the structure of lampbrush chromosomes and its significance

Q.5. Explain the following:-

1) Significance of mitosis

2) spermatogenesis (Labelled digarm)

3) Metaphase of mitosis

OR

4) Significance of mitosis

5) Structure of mature sperm

6) Mechanism of fertilization

Q.6. Describe the extra embryonic membrane in chick.

OR

Give an account of cleavage and biastulation in frog.

Q.7. Attemt the following:-

1) Uses of stem cells

2) Significance of parthenogenesis

3) Choriovitelline placenta

OR

4) Types of stem cells

5) Function of placenta

6) Types of parthenogenesis

Sant Gadge Baba Amravati University, Amravati

The Berar Education Society's

Sitabai Aets, Commerce and Science College, Akola

Preliminary Examination- 2018

B. Sc I (Sem II)

Subject- ZOOLOGY

(Cell and Developmental Biology)

Time: 3 hrs **Marks: 80**

Note: All questions are compulsory. Draw neat well labelled diagram whenever nessary. Q.1. carry 8 marks and reamaining questions carries 12 marks.

Q.1. a) Fill in the blanks:-

1. Chromosomes have been classified into_____.
2. During _____stage the chromosomes are arranged at equatorial plate.
3. During _____ stage of respiration, glucose is broken down into pyruvic acid.
4. Fusion of male and female gametes forms _____.

b) Choose the correct alternative from the following:- 2

1. _____ are the reproductive cells.

a) Epithelial cells b) Muscle cells

b) Gametes d) None of these

1. The team mitochondrion was coined by _____.

a) Porter b) Gorter and Grendel

b) Benda d) Camillo Golgi

1. During _____ stage of mitosis, two nuclei can be seen

in a single cell.

a) Metaphase
b) Telophase
b) Prophase
d) Anaphase

a) Answer in one sentence:- 2

1. What is spermatogenesis?
2. What is cleavage?
3. What is sperm?
4. What is the main function of nucleolus?

Q.2. Explain the following:-

a. Functions of Plasma Membrane.
b. Types of Endoplasmic reticulum.
c. General organization of prokaryotic cell.

OR

a. Functions of Endoplasmic reticulum.
b. Fulid mosaic model of plasma membrane.
c. General organization of Eukaryoti cell.

Q.3. Describe the Ultrastructure and functions of mitochondria.

OR

Describe the Ultrastructure and functions of Golgi complex.

Q.4. Explain the following:- 12

1. Functions of nucleus.
2. Structure of Lampbrush chromosome.
3. Centromere.

OR

1. Nucleolus.
2. Structure of typical chromosome (Diagram only)
3. Structure of Polytene chromosome.

Q.5. Describe the process of mitosis and its significance.

OR

Describe the mechanism of fertilization.

Q.6. Describe the following:- 12

1. Yolk Sac
2. Blastulation in Frog
3. Gastrulation in chick.

OR

1. Cleavage in Amphioxus
2. Fate map of frog
3. Significance of embryonic membranes

Q.7. Explain the following:-

1. yolk sac placenta
2. Significance of parthenogenesis
3. Regeneration in vertebrates. (one example)

OR

1. Uses of stem cells
2. Function of placenta
3. Arrhenotoky parthenogenesis

Sant Gadge Baba Amravati University, Amravati
The Berar Education Society's
Sitabai Aets, Commerce and Science College Akola
Preliminary Examination- 2019
B. Sc I (Sem II)
Subject- ZOOLOGY
(Cell and Developmental Biology)

Time: 3 hrs **Marks: 80**

Note: All questions are compulsory. Draw neat well labelled diagram whenever nessary. Q.1. carry 8 marks and reamaining questions carries 12 marks.

Q.1. a) Fill in the blanks:-

1. Chromosomes have been classified into_____.
2. During _____stage the chromosomes are arranged at equatorial plate.
3. During _____ stage of respiration, glucose is broken down into pyruvic acid.
4. In which stage of meiosis chiasmata are formed _____.

b) Choose the correct alternative from the following:- 2

1. Which cells undergo cell division?
a) Prokaryotic cells b) Eukaryotic cells
b) Cancer cells d) None of these
2. The team mitochondrion was coined by _____.
a) Porter b) Gorter and Grendel
b) Benda d) Camillo Golgi
3. During _____ stage of mitosis, two nuclei can be seen in a single cell.
a) Metaphase b) Prophase
b) Telophase d) Anaphase

c) Answer in one sentence:- 2

1. What is spermatogenesis?
2. What is cleavage?
3. What is Balbiani ring?
4. What is the main function of nucleolus?

Q.2. Explain the following:-

a. Functions of Plasma Membrane.
b. Types of Endoplasmic reticulum.
c. General organization of prokaryotic cell.

OR

a. Functions of Endoplasmic reticulum.
b. Fulid mosaic model of plasma membrane.
c. General organization of Eukaryoti cell.

Q.3. Describe the Ultrastructure and functions of mitochondria.

OR

Describe the Ultrastructure and functions of Golgi complex.

Q.4. Explain the following:- 12

1. Functions of nucleus.
2. Structure of Lampbrush chromosome.
3. Centromere.

OR

1. Nucleolus.
2. Structure of typical chromosome (Diagram only)
3. Structure of Polytene chromosome.

Q.5. Describe the process of mitosis and its significance.

OR

Describe the mechanism of fertilization.

Q.6. Describe the following:- 12

1. Yolk Sac
2. Blastulation in Frog
3. Gastrulation in chick.

OR

1. Cleavage in Amphioxus
2. Fate map of frog
3. Significance of embryonic membranes

Q.7. Explain the following:-

1. yolk sac placenta
2. Significance of parthenogenesis
3. Regeneration in vertebrates. (one example)

OR

1. Primitiven streak
2. Structure of Hen's egg
3. Function of amnion and chorion

Sant Gadge Baba Amravati University, Amravati

The Berar Education Society's

Sitabai Aets, Commerce and Science College Akola

Preliminary Examination- 2022

B.Sc I (Sem II)

Subject- ZOOLOGY

(Cell and Developmental Biology)

Time: 3 hrs **Marks: 80**

Note: All questions are compulsory. Draw neat well labelled diagram whenever nessary. Q.1. carry 8 marks and reamaining questions carries 12 marks.

Q 1 A) Fill in the blanks:-

1) Lampbrush hromosomes occurs in _____.

2) The prokaryotic ribosomes are _____.

3) Lyosomes are also called as _____.

4) Division of cytoplasm is known as _____.

B) Choose correct alternative from the following:-

1) Ingestion of liquid particles by a cell is called as _____.

a) phagocytosis b) pinocytosis

c) Lysis d) none of the above

2) Who discovered ribosomes in animal cell?

a) waston b) Tatum

c) Cowdy d) palade

3) The tip of chromosomes is called

a) Metamere b) chromomere

c) Micromere d) Telomere

4) In adult which ceii is used as stem cell?

a) Bone marrow cells b) Embryonic cell

c) Muscle cell d) None of the above

C) Answer in one sentence:-

1) What is spermatogenesis?

2) What is cell division ?

3) Who discovered lysosomes?

4) Who discovered cell?

Q.no.2. Explain the following:-

1) Structure of prokaryotic cell

2) Function of plasm membrane

3) Structure of Endoplasmic reticulum

OR

4) Structure of plasma membrane

5) Fluid Mosaic model of plasma membrane

6) Function of Endoplasmic reticulum

Q.3 Describe the following

1) Function of Golgi complex

2) ULtrastructure of ribosomes

3) Structure of mitochondria

OR

4) Structure of Golgi complex

5) Function of Ribosomes

6) Function of Lysosomes

Q.4 Describe the structure and function of nucleolus

OR

Describe the structure of lampbrush chromosomes and its significance

Q.5. Explain the following:-

1) Significance of mitosis

2) spermatogenesis (Labelled digarm)

3) Metaphase of mitosis

OR

4) Significance of mitosis

5) Structure of mature sperm

6) Mechanism of fertilization

Q.6. Describe the extra embryonic membrane in chick.

OR

Give an account of cleavage and biastulation in frog.

Q.7. Attemt the following:-

1) Uses of stem cells

2) Significance of parthenogenesis

3) Choriovitelline placenta

OR

4) Types of stem cells

5) Function of placenta

6) Types of parthenogenesis

Sant Gadge Baba Amravati University , Amravati

The Berar Education Society's

Sitabai Arts ,Commerce and Science College Akola

Preliminary Examination -2018

B.Sc. II (Sem IV)

Subject -ZOOLOGY

(Advanced Genetics and Animal Ecology)

Time: Three Hours Maximum Marks:80

Note (1) ALL questions are compulsory

(2) Question No. 1 carries 8 marks and remaining SIX questions carry 12 marks each

(3) Illustrate your answers with suitable diagrams wherever necessary.

Q.1. (a) Fill in the blanks: 08 M.

i) In supplementary factor the Mendelian ratio is modified to --------

ii) ----------syndrome results due to trisomy of chromosome 18

(ii)---------- is a surgical procedure that cuts or blocks the vas deferens.

(iv)---------- is universal solvent

(b) Choose correct alternative for the following:

(v) Recessive gene can be expressed in condition.

(A) Heterozygous (B) Homozygous

(C) None of these (D) Both the above

(vi) People suffering from Tuner's syndrome do not show

(A) Autosomes (B) Barr body

(C) Nucleolus (D) None of these

(vii) CVS is usually performed between weeks.

(A) Ten to Twelve (B) Twelve to Fourteen

(C) Thirteen to fifteen (D) Eleven to Thirteen

viii) Animals which tolerate wide range of salinity are called as

(A) Euryhaline (B) Stenohaline

(C) Eurythermal (D) Stenothermal

(c) Answer in one sentence:

(ix) Define alleles

(x) What is linkage ?

(xi) What are twins?

(xii) What is ecosystem

Q.2. Explain the following: 12 M.

(a) Monohybrid cross
(b) Lethal fact
(c) Law of segregation.

OR

(d) Dihybrid cross
(e) Inhibitory factor
(1) Law of dominance.

Q.3 What is linkage? Describe complete and incomplete linkage with suitable examples. 12M.

OR

What is crossing over? Describe the factors influencing crossing over and give its significance.

Q.4. Describe the following 12 M.

(g) Genic balance theory of sex determination in Drosophila
(h) Haemophilia
(i) Cystic fibrosis.

OR

(j) XX-XY type sex determination
(k) Turner's syndrome
(l) Colour-blindness

Q.5. Describe recessive genes and consanguineous marriages 12M.

OR

Describe different kinds of twins and their significance

Q.6. Attempt the following: 12 M.

(m) Homeotherms
(n) Dormancy
(0) Effect of light on reproduction.

OR

(p) Poikilotherms
(q) Aestivation
(r) Effect of light on migration of animals.

Q.7. Describe the following: 12M.

(s) Energy flow in ecosystem (t) Pyramid of biomass (u) Types of estuaries.

OR

(v) Food web (w) Ecological niche (x) Adaptation in Eusturine ecosystem.

Sant Gadge Baba Amravati University, Amravati

The Berar Education Society's

Sitabai Arts, Commerce and Science College Akola

Preliminary Examination -2019

B.Sc. III (Sem VI)

Subject -ZOOLOGY

(Molecular Biology and Advanced Genetics)

Time: Three Hours Maximum Marks:80

Note :(1) All questions are compulsory

(2) Question No. 1 carries 8 marks,

(3) Question No. 2 to 7 carry 12 marks each.

(4) Illustrate your answers with suitable diagrams wherever necessary.

Q 1. (a) Fill in the blanks:

(i) Synthesis of mRNA from DNA is known as----------

(ii).....organism is used for Griffith Experiment.

(iii) Nitrogenous bases are classified into..... and pyrimidine.

(iv) Enzyme used to join DNA fragment is .....

(b) Choose the correct alternative from the following:

(v) Nucleotide is composed of---------

(a) Deoxyribose sugar, phosphate and nitrogen base (b) Phosphate and sugar

(c) Nitrogen base and Phosphate (d) Deoxyribose sugar and nitrogen base

(vi) Antibodies are found in----------

(a) Blood cells (b) Leukocytes

(c) Serum (d) None of the above

(vii) In humans trisomy of 21 chromosome causes

(a) Down's syndrome (b) Patau's syndrome

(c) Turner's syndrome (d) All of the above

(viii) Humoral immunity is controlled by ----------

(a) A-cells (b) B-cells

(c) C-cells (d) T-cell

(c) Answer in one sentence each

(ix) Who has coined the term gene?

(x) What is trisomy

(xi) How many hydrogen bends are present between Adenine and Thymine?

(xii) Define translocation

Q.2. Describe the following

(a) Nitrogenous Bases

(b) m-RNA

(c) Griffith's experiment

OR 12 M.

(d) Functions of -RNA

(e) Clover-leaf model of tRNA

(f) Watson and Crick double helical model of DNA (Diagram only)

Q.3. Attempt the following

(g) Spinocerebellar ataxia

(h) Jumping gene

(i) Cistron 12M.

OR

(j) One gene one enzyme hypothesis

(k) Split gene

(l)Enzymes in DNA replication (name and function)

Q.4. Describe Lac-operon model of E coli. 12M.

OR

Describe mechanism of protein synthesis.

Q.5. Explain the following:

(m) Euploidy

(n) Western Blotting technique

(0) Deletion 12M.

OR

(p) Polymerase Chain Reaction (PCR)

(q) De Vries mutation theory

(r) Significance of mutation

Q.6. Describe the following

(s) phage vector

(t) Enymes in recombinant DNA Technology

(u) Hazards of biotechnology 12M.

OR

(v) Somatic cell hybridization

(w) Application of biotechnology in health sciences

(x) Monoclonal antibodies

Q.7. Describe typos, production and functions of antibodies 12M.

OR

Describe cells of immune system

Sant Gadge Baba Amravati University , Amravati

The Berar Education Society's

Sitabai Arts ,Commerce and Science College Akola

Preliminary Examination -2022

B.Sc. II (Sem IV)

Subject -ZOOLOGY

(Advanced Genetics and Animal Ecology)

Time: Three Hours Maximum Marks:80

Note (1) ALL questions are compulsory

(2) Question No. 1 carries 8 marks and remaining SIX questions carry 12 marks each

(3) Illustrate your answers with suitable diagrams wherever necessary.

Q.1 (A) Fill in the blanks: 08 M.

(i)The phenomenon of co-existence of two or more genes in same chrome is-----

(ii)Chromosomes not concerned with sex are------

(iii) Activation is also called us

(iv) The animals whose body temperature changes with surrounding temperature are called

(B) Choose correct alternative

(v) Disease Haemophilia is a ----

(a) X-linked inheritance type. (b) XY-linked

(c) Y-linked (d) None

(vi Uncontrolled jerking of body occurs in-----

(a) Sickle cell anemia (b) Huntington's chorea

(c) Diabetes (d) Cystic fibrosis

(vi) The place where freshwater joins the saltwater is called------

(a) Pond (b) River -Share

(c) Estuary (d) Shore

(viii) The Karyotype of Klinefeher's syndrome individual is

(a) 45X (b) 47XXY

(c) 47X (d) None

(C) Answer in one sentence each:

(a) What is a Lethal Factor?

(b) What is Crossing Over?

(c) What are dizygotic twins also called?

(d) What in Parasitism?

Q.2Describe the following: 12M.

(a) Monohybrid cross

(b) Duplicate factor

(c) Supplementary factor

OR

(d) Dihybrid cross

(e) Complementary factor.

(f) Bock cross and Test cross

Q.3.Fxplain the following: 12M.

(g) Types of linkage.

(h) Breakage and Exchange Theory

(i) Inheritance of blood group in Man

OR

(j)Crossing over

(k) Copy choice theory

(l)Inheritance of eye colour in Drosophila.

Q.4 Describe the following: 12M.

(m)Chromosomal theory of sex determination

(n) Gynandromorphs

(o) Turner's Syndrome

OR

(p) Genie balance theory of sex determination.

(q) Sickle cell anemia.

(r) Klinefelter's syndrome

Q5. Give an account on kinds of twins and significance of twin study. 12M.

OR

Give an account on birth control measures in Female

Q.6. Explain the following 12M.

(s) Hibernation

(t) Effects of light on Metamorphosis.

(u) Photoperiodism.

OR

(v) Aestivation

(w) Photokinesis.

(x) Effects of light an Migration

Q.7. Give an account on Lentic and Lotic system 12M.

OR

Explain the characteristics of Marine ecosystem with special reference to salinity and temperature

Sant Gadge Baba Amravati University , Amravati

The Berar Education Society's

Sitabai Arts ,Commerce and Science College Akola

Preliminary Examination -2019

B.Sc. II (Sem IV)

Subject -ZOOLOGY

(Advanced Genetics and Animal Ecology)

Time: Three Hours Maximum Marks:80

Note (1) ALL questions are compulsory

(2) Question No. 1 carries 8 marks and remaining SIX questions carry 12 marks each

(3) Illustrate your answers with suitable diagrams wherever necessary.

Q.1. (a) Fill in the blanks: 08 M.

(i)---------- is a surgical procedure that cuts or blocks the vas deferens.

(ii)---------- is universal solvent

iii) In supplementary factor the Mendelian ratio is modified to --------

iv) ---------syndrome results due to trisomy of chromosome 18

(b) Choose correct alternative for the following:

(v) Recessive gene can be expressed in condition.

(A) Heterozygous (B) Homozygous

(C) None of these (D) Both the above

vi) Animals which tolerate wide range of salinity are called as

(A) Euryhaline (B) Stenohaline

(C) Eurythermal (D) Stenothermal

(vii) People suffering from Tuner's syndrome do not show

(A) Autosomes (B) Barr body

(C) Nucleolus (D) None of these

(viii) CVS is usually performed between weeks.

(A) Ten to Twelve (B) Twelve to Fourteen

(C) Thirteen to fifteen (D) Eleven to Thirteen

(c) Answer in one sentence:

(ix) What are twins?

(x) What is ecosystem

(xi) Define alleles

(xii) What is linkage

Q.2. Explain the following: 12 M.

(a) Dihybrid cross

(b) Inhibitory factor

(c) Law of dominance

OR

(d)Monohybrid cross

(e) Lethal fact

(f) Law of segregation.

Q. 3.What is crossing over? Describe the factors influencing crossing over and give its significance 12M.

OR

What is linkage? Describe complete and incomplete linkage with suitable examples.

Q.4. Describe the following 12 M.

(g) Genic balance theory of sex determination in Drosophila

(h) Haemophilia

(i) Colour-blindness

OR

(j) XX-XY type sex determination

(k) Turner's syndrome

(l) Cystic fibrosis.

Q.5. Describe different kinds of twins and their significance 12M.

OR

Describe recessive genes and consanguineous marriages

Q.6. Attempt the following: 12 M.

(m) Homeotherms

(n) Aestivation

(O) Effect of light on reproduction.

OR

(p) Poikilotherms

(q) Dormancy

(r) Effect of light on migration of animals.

Q.7. Describe the following: 12M.

(s) Energy flow in ecosystem (t) Food web (u) Ecological niche

OR

(v) Pyramid of biomass (w) Types of estuaries. (x) Adaptation in Eusturine ecosystem.

Sant Gadge Baba Amravati University, Amravati

The Berar Education Society's

Sitabai Arts, Commerce and Science College Akola

Preliminary Examination -2022

B.Sc. III (Sem VI)

Subject -ZOOLOGY

(Molecular Biology and Advanced Genetics)

Time: Three Hours Maximum Marks:80

Note:-(1) All questions are compulsory.

(2) Question No. 1 carries only 8 marks.

(3) Questions 2 to 7 carry 12 marks each.

(4) Illustrate your answers with suitable diagrams wherever necessary.

Q 1. (A) Fill in the blanks 08M.

(i) During DNA replication..... strand is synthesized continuously.

(ii) Deletion or addition of chromosome results in condition called..

(iii) In B DNA purine and pyrimidine ratio is

(iv) Bursal cells are also known as

(B) Choose the correct alternative from the following:

(v) The technique used for DNA Duplication is -------

(a) Western blotting. (b) Northern blotting

(c) Southern blotting. (d) PCR

(vi) Which of the following is a genetic vector--------

(a) Plasmid. (b) Phage

(c) Cosmid. (d) All the above

(vii) The enzyme required for transcription is: ----------

(a) RNA Polymerase. (b) DNA Polymerase

(c) Endonuclease. (d) None of the above

(viii) In human trisomy of 21st chromosome causes --------

(a) Turner's Syndrome. (b) Pataus Syndrome

(c) Down's Syndrome. (d) All of the above.

(C) Answer in ONE sentence:

(ix) What is lagging strand?

(x) Define PCR technique,

(xi) How many different combinations are possible in triplet code?

(xii) Which isotopes were used in blender experiment?

Q.2. Describe the following:-

(a) Purine bases

(b) Avery, Macleod and Okcarty experiment

(c) m-RNA OR

(d) Griffith's experiment.

(e) Chemical composition of RNA

(f) Z DNA.

Q.3. Explain the following:-

(g) Semiconservative method of DNA replication.

(h) Concept of gene.

(i) Overlapping genes. 12M.

OR

(J) Concept and action of cistron.

(k) One gene one polypeptide theory with one example.

(l) Split genes. 12M

Q.4. Explain the following:-

(m) Wobble hypothesis.

(n) Britten-Davidson model.

(0) Role of amino acyl t-RNA synthetase.

OR

(p) Lac operon model in E-coli.

(q) Reverse transcription.

(r) Post translational processing of protein.

Q.5.Describe the following: 12M.

(s) Deletion.

(t) Northern blotting.

(u) Types of polyploidy. 12M.

OR

(v) Polymerase chain reaction.

(w) Frame shift mutation.

(x) Types of duplication.

Q 6. Describe physical methods of gene transfer. 12M

OR

Describe practical applications and suspected hazards of biotechnology.

Q 7. Describe types, production and function of antibodies. 12M

OR

Describe cells of immune system.

संत गाडगेबाबा अमरावती विद्यापीठ अमरावती सलग्नित

द बेरारजनरल एज्युकेशन सोसायटी द्वारा संचलित

सीताबाई कला वाणिज्य व विज्ञान महाविद्यालय अकोला

सराव परीक्षा - २०२१- २०२२

बीएससी -१ (सत्र पहिले)

विषय -मराठी

MARATHI (New)

(Compulsory)

वेळ दोन तास एकूण गुण 40

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1. 'अंधश्रद्धांचा महापूर' या पाठाच्या द्वारे डॉ नरेंद्र दाभोळकर यांचे विचार स्पष्ट करा

किंवा

या देशाला काय देऊ शकतो .अब्दुल कलाम यांच्या विचारांचा परामर्श घ्या .जे.पी.या ए '2 .

खालीलपैकी कोणतेही दोन प्रश्न सोडवा 10

करा.

(अ) डॉ. बाबासाहेब आंबेडकर यांनी स्त्री शिक्षणाचा आग्रह का धारला होतो स्पष्ट करा

(ब) स्वामी विवेकानंदाच्या विचारातील आपले राष्ट्रीय महापाप कोणते ते सांगा.

(क) समाजसुधारक की क्रांतिकारक या पाठाच्या आधारे महात्मा फुले यांचे मानवकेंद्री विचार स्पष्ट

(ड) विचार नियमामुळे सकारात्मकतेतून होणार परिणाम सांगा.

3. कोणतेही दोन प्रश्न सोडवा : 10

(अ) गुरुचे महत्व 'गुरुवंदना' या काव्याच्याद्वारे स्पष्ट करा.

(ब) 'धरिला पंढरीचा चोर गळा बाधोनिया दारे।।' असे जनाबाई का म्हणतात ?

(क) महदाइसेच्या अभंगातील श्रीकृष्ण वर्णन तुमच्या शब्दांत रेखाटा.

(5) संत तुकारामाच्या अभंगाचे रसग्रहण करा.

4. कोणतेही दोन प्रश्न सोडवा. 10

(अ) पत्र लेखनाचे प्रकार सांगून त्याचे स्वरूप स्पष्ट करा.

(ब) टिप्पणीचे प्रकार सांगून, टिप्पणी लेखनाचा नमुना तयार करा.

(क) सर्व साधारण भविष्य निर्वाह निधीतून परतावा अग्रिम रकमेची मागणी करणारे सहसंचालक उच्चशिक्षण अमरावती या नावाने पत्र लिहा

(ड) टिप्पणी लेखनाची पद्धत समजावून सांगा.

संत गाडगेबाबा अमरावती विद्यापीठ ,अमरावती संलग्नित

द बेरार जनरल एज्युकेशन सोसायटी द्वारा संचलित

सीताबाई कला वाणिज्य व विज्ञान महाविद्यालय अकोला

सराव परीक्षा २०१८ - २०१९

बी .एससी -१ (सत्र पहिले)

विषय-- मराठी

वेळ [दोन तास : [एकूण गुण 40

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1. डॉ. बाबासाहेब आंबेडकरांचा स्त्री विषयक दृष्टिकोन स्पष्ट करा. 10

किंवा

महात्मा फुले केवळ समाजसुधारक नव्हेतर क्रांतिकारक होते? भोळे का म्हणतात .ल .भा .असे डॉ .

2. खालीलपैकी कोणतेही दोन प्रश्न सोडवा : 10

(अ) जागतिकीकरणातही अंधश्रद्धा तशाच कायम आहेत. यांची कारणे सांगा.

(ब) ए.पी.जे. अब्दुल कलाम यांचे शिक्षण विषयक विचार स्पष्ट करा.

(क) विचारनियमामुळे सकारात्मकतेतून होणारा परिणाम सांगा.

(ड) स्वामी विवेकानंद कोणत्या विचाराला राष्ट्रीय महापाप म्हणतात ? ते सांगा.

3. खालीलपैकी कोणतेही दोन प्रश्न सोडवा : 10

(अ) 'गुरुवंदना' या कवितेच्या आधारे गुरुचे महत्व सांगा.

(ब) जनाबाईच्या अभंगाचा आशय स्पष्ट करा.

(क) महदाइसेच्या अभंगातील श्रीकृष्ण वर्णन तुमच्या शब्दात रेखाटा.

(ड) 'भिक्षापात अवलंबणे / जळो जिणें लाजिरवाणे' असे संत तुकाराम महाराज का म्हणतात ?

4. खालीलपैकी कोणतेही दोन प्रश्न सोडवा : 10

(अ) कार्यालयीन पत्रव्यवहार म्हणजे काय ? ते सांगून पत्रलेखनाचे प्रकार सांगा. 10

(ब) टिप्पणीचे प्रकार सांगून टिप्पणी लेखनाची पद्धत समजावून सांगा.

(क) कार्यालयाकडून पाठविल्याजाणाऱ्या पत्राचे स्वरूप स्पष्ट करा.

(ड) टिप्पणी लेखनाचा एक नमुना तयार करा.

संत गाडगेबाबा अमरावती विद्यापीठ , अमरावती संलग्नित

द बेरार जनरल एज्युकेशन सोसायटी द्वारा संचालित

सीताबाई कला वाणिज्य व विज्ञान महाविद्यालय अकोला

सराव परीक्षा२०१७--२०१८

बी.एससी -१ (सत्र पहिले)

विषय मराठी

वेळ दोन तास एकूण गुण 40

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1 अखेरचे कीर्तन या पाठातील गाडगेबाबा यांचा संदेश तुमच्या शब्दात मांडा

किंवा

"पुरुष सूक्त' या पाठात लक्ष्मण लोटे यांनी मानवी उत्क्रांतीचे वास्तव कसे रेखाटले आहे 10

2. खालीलपैकी कोणतेही दोन प्रश्न सोडवा 10

अ) चंद्रकांत पाटील यांनी वर्तमान संस्कृती व कथासाहित्यचीमांडणीकशीकेलीआहे

येशू ख्रिस्ताची लोक शिक्षण (ब)ाचीशैली सांगा

(क) महात्मा महात्मा ज्योतिबा फुले यांच्या कार्यावर प्रकाश टाक

ड) लोकभ्रम या पाठातील विष्णु शास्त्रीचिपळूणकरांचे विचार स्पष्ट करा.

3. खालीलपकी कोणी दोन प्रश्न सोडवा 10

(अ) "टिळाटोपी उंच दावी "यातुनतुकाराम महाराज कोणता उपदेश करतात .

ब) पसायदान या कवितेत ज्ञानेश्वर महाराज देवाजवळ कोणती मागणी करतात

(क) वृक्ष आणि सज्जन यातील फरक नामदेव कसा स्पष्ट करतात

(ड)' डोईचा पदर 'या कवितेतील जनाबाईच्या मनातील भावना शब्दांकित करा

4. खालीलपैकी कोणतेही दोन प्रश्न सोडवा. 10

(अ) कार्यालयीन पत्रव्यवहार म्हणजे काय ते सांगून लेखनाचे प्रकार लिहा.

(ब) टिप्पणी लेखनाचे स्वरूप सांगून टिप्पणीचे प्रकार विशद करा.

(क) टिप्पणी लेखनाचा नमुना लिहा

(ड) कार्यालयाकडून पाठवल्या जाणाऱ्या पत्राचे स्वरूप स्पष्ट करा

संत गाडगे बाबा अमरावती विद्यापिठ, अमरावती संलग्नीत
द बेरार जनरल एज्युकेशन सोसायटी व्दारा संचालीत
सीताबाई कला, वाणिज्य व विज्ञान महाविद्यालय, अकोला
सराव परिक्षा - २०२१-२०२२
बि.एस्सी. भाग- १ (सत्र दुसरे)
विषय : मराठी

Time : Two Hours] [Maximum Marks : 40

1. संत गाडगेबाबांच्या कीर्तनशैलीतून त्यांनी कोणत्या समाजविघातक बाबींनर ताशेरे ओढले आहेत, ते सोदाहरण स्पष्ट करा.

किंवा

प्रा. शोभा कडू यांनी 'श्रींचा शैक्षणिक दृष्टिकोण' कसा सांगितला आहे ? तुमच्या शब्दात रेखाटा. 10

2. खालीलपैकी कोणतेही **दोन** प्रश्न सोडवा :—

(अ) "भारत 2020 सालापर्यंत जगातले पहिल्या क्रमांकाचे ज्ञाननिर्मिती केंद्र म्हणून नक्की सुप्रतिष्ठित होईल." असे डॉ. रघुनाथ माशलेकर यांना का वाटते ?

(ब) महात्मा बसवेश्वर यांच्या, सामाजिक सुधारणा घडवून आणणाऱ्या कृतिशीलतेचा परिचय, थोडक्यात करून द्या.

(क) 'राष्ट्रसंत तुकडोजी : आधुनिक परिप्रेक्ष्य' या पाठाआधारे 'राष्ट्रीयता व राष्ट्रधर्म' या संकल्पना स्पष्ट करा.

(ड) वि.दा. सावरकर यांनी कोणत्या 'सात स्वदेशी बेड्या' तोडण्यास सांगीतले आहे ? 10

3. खालीलपैकी कोणतेही **दोन** प्रश्न सोडवा :—

(अ) राजेश प्रभाकर महल्ले यांनी 'माती' या कवितेतून कोणता आशावाद व्यक्त केला आहे ?

(ब) 'शेवटीमाणूस डरावे माणसाने' या काव्यातून चोरमारे यांनी कोणता संदेश दिला आहे.

(क) दिंडी या कवितेतील आशय स्पष्ट करा.

(ड) 'ज्ञानवंदना' या कवितेच्याद्वारे डॉ. पंजाबराव देशमुख यांच्या जीवनावर प्रकाश टाका. 10

4. खालीलपैकी कोणतेही **दोन** प्रश्न सोडवा :—

(अ) बातमी म्हणजे काय ? ते सांगून बातमी लिहितांना कोणत्या गोष्टीची काळजी घ्यावी.

(ब) जाहिरात मसुदा म्हणजे काय ? ते सांगून मसुदा लेखकाकडे असणारे गुण सांगा.

(क) आकाशवाणीसाठी तयार करण्यात येणाऱ्या बातमीची रूपरेषा तुमच्या शब्दात लिहा.

(ड) घोषवाक्य म्हणजे काय ? एस.टी. महामंडळ, भारतीय स्टेट बँक आणि आयडिया कनेक्शन यांची घोषवाक्य लिहा. 10

संत गाडगे बाबा अमरावती विद्यापिठ, अमरावती संलग्नीत
द बेरार जनरल एज्युकेशन सोसायटी व्दारा संचालीत
सीताबाई कला, वाणिज्य व विज्ञान महाविद्यालय, अकोला
सराव परिक्षा - २०१८-२०१९
बि.एस्सी. भाग- १ (सत्र दुसरे)
विषय : मराठी

Time : Two Hours] [Maximum Marks : 40

1. 'श्रींचा शैक्षणिक दृष्टिकोण' या पाठाच्या द्वारे प्रा. शोभा कडू यांचे विचार स्पष्ट करा. 10

किंवा

'आज आकाशातल्या विज्ञान आणि तंत्रज्ञानलेरीज नव्या उपग्रहांची निर्मिती करणे, त्याच्या उड्डाणाचे नवे तंत्रज्ञान विकसीत करणे या बाबतीतले भारताचे सामर्थ्य विश्वासही आणि अभिमान आहे.' असा विश्वास डॉ. रघुनाथ माशेलकर यांना आहे. स्पष्ट करा.

2. खालीलपैकी कोणतेही दोन प्रश्न सोडवा :— 10

(अ) महात्मा बसवेश्वर यांच्या सामाजिक सुधारणा वाढून आपल्याच कृतिशीलतेचा परिचय तुमच्या शब्दांत करुन द्या.

(ब) राष्ट्रसंताचे, 'ग्राम स्वराज्याचे स्वप्न' स्पष्ट करा.

(क) गाडगेबाबांनी अंधश्रद्धेवर घणाघाती हल्ला चढवत एका तत्पर समाज निर्मिती साठी कसे प्रयत्न केले ते स्पष्ट करा.

(ड) वि.दा. सावरकरांनी कोणत्या सात स्वदेशी वेडया तोडण्यात सांगितले आहे ?

3. खालीलपैकी कोणतेही दोन प्रश्न सोडवा :— 10

(अ) 'माती' या कवितेतील आशय स्पष्ट करा.

(ब) 'गोष्टी माणूस उराव्या माणसाने असे मनिषेने रायोजी डोरमारे का म्हणतात ?

(क) 'दिंडी' या कवितेत श्रीकृष्ण रुक्मिन यांनी माणसाच्या वाटयाला आलेले दुःखही उदात्त संस्कृत मांडले आहे', अधोरेखित करा.

(ड) 'शानवंदना' या काव्याद्वारे डॉ. पंजाबरावदेशमुख यांच्या जीवनावर प्रकाश टाका.

4. खालीलपैकी कोणतेही दोन प्रश्न सोडवा :— 10

(अ) बातमी म्हणजे काय ? हे सांगून बातमी लिहितांना कोणत्या गोष्टींची काळजी घ्यावी.

(ब) आकाशवाणीसाठी तयार करण्यात येणाऱ्या बातमीची रूपरेषा तुमच्या शब्दात लिहा.

(क) दूरदर्शनसाठी जाहिरात मसुदा लेखन करतांना कोणत्या बाबी लक्षात घ्याव्या लागतात.

(ड) 'जाहीर निवेदन' म्हणजे काय ? जाहीर निवेदनात कोणकोणत्या गोष्टींचा उल्लेख होतो ?

संत गाडगे बाबा अमरावती विद्यापिठ, अमरावती संलग्नीत
द बेरार जनरल एज्युकेशन सोसायटी व्दारा संचालीत
सीताबाई कला, वाणिज्य व विज्ञान महाविद्यालय, अकोला
सराव परिक्षा - २०१७-२०१८
बि.एस्सी. भाग- १ (सत्र दुसरे)
विषय : मराठी

वेळ : तीन तास] [एकूण गुण : 40

1. "शारीरिक प्रतिकूलतेवर मानवी मनाने मिळवलेला विजय म्हणजे स्टीफन हॉकींग " या विधानाची सार्थकता पाठाच्या आधारे पटवून द्या. 10

किंवा

'डॉ आंबेडकराचे ग्रंथप्रेम' या पाठाच्या आधारे डॉ. आंबेडकरांच्या व्यक्तिमत्वातील विविध पैलू सविस्तर उलगडून दाखवा.

2. खालीलपैकी कोणतेही दोन प्रश्न सोडवा : 10

(अ) चुकीच्या शब्दासाठी नवे पर्याय.

(ब) विज्ञानाची ओळख मातृभाषेतून.

(क) 'चिंतन' पाठाचा आढावा घ्या

(ड) 'जगायचं कशासाठी' या पाठातून डॉ. निर्मलकुमार फडकुले यानी जीवन जगण्याचा आशावादी दृष्टिकोन कशाप्रकारे सांगितला आहे, ते थोडक्यात सांगा.

3. खालीलपैकी कोणतेही दोन प्रश्न सोडवा :- 10

(अ) 'विधात्र्यार्प्रित' या कवितेचा अर्थ सांगा.

(ब) 'लपे करमाची रेखा' या कवितेतून बहिणाबाईचे विचार स्पष्ट करा.

(क) 'संग्राम' या कवितेचा आशय स्पष्ट करा.

(ड) 'भेदर' या कवितेचे रसग्रहण करा.

4. खालीलपैकी कोणतेही दोन प्रश्न सोडवा :- 10

(अ) बातमी लेखन – बातमी म्हणजे काय ?

(ब) जाहिरात–मसुदा लेखन

(क) मथळा

(ड) घोषवाक्ये तयार करा.