



PO-419
B. Sc. (Sem. IV) Examination
Seat No. _____

April / May - 2016
Botany : ES - BOT - 213

(Biodiversity) (Elective)

Time : 3 Hours]

[Total Marks : 50

સૂચના : (૧) આ પ્રશ્નપત્રમાં કુલ ત્રણ પ્રશ્નો છે.
(૨) બધા પ્રશ્નો કરજીયાત છે. જમણા બાજુના એક ગુણ દર્શાવે છે.
(૩) પ્રશ્નોમાં જેટલે જણાય ત્યાં આકૃતિ દોરવી.

૧ (અ) સંવસ્તર વર્ણવો. (૦૫ મેં ભે)
(૧) જીવવિવિધતાનું કલાત્મક અને અભિવ્યક્તિ મહત્ત્વ વર્ણવો.
(૨) જીવવિવિધતાના લીધે આરતનું જીવગૌણીકરણ વર્ણવો.
(૩) જીવવિવિધતાના પ્રકારો.

૨ (બ) ટૂંકનીંધ લખો. (૦૫ મેં ભે)
(૧) જનીનિક વિવિધતાનું મહત્ત્વ.
(૨) ગૃહસ્થાનની જીવવિવિધતા
(૩) આલ્કા, જીટા અને ગીમા વિવિધતા

૨ (અ) સંવસ્તર વર્ણવો. (૦૫ મેં ભે)
(૧) જીવવિવિધતાના નાણા આટની કારણી સંવસ્તર વર્ણવો.
(૨) ટેડ-સિસ્ટમની કૃત્રિમી જણાવો અને આરતની નાણાકીય જાતિઓ વિશે નીંધ આપો.
(૩) જીવવિવિધતાની જાળવણી માટે સરકારી સંસ્થાઓ.

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(10) ઉપરનામાં આપેલા વાક્યોમાં કયો વાક્ય સાચો છે ?

- (ક) ૧૮
- (ખ) ૧૨
- (ગ) ૧૯
- (ઙ) ૧૬

(11) આપેલામાં કયો વાક્ય સાચો છે ?

- (ક) ૨૮૨
- (ખ) ૨૨૨
- (ગ) ૧૩૧
- (ઙ) ૨૨૨

(12) આપેલામાં કયો વાક્ય સાચો છે ?

- (ક) આપેલામાં કયો વાક્ય સાચો છે ?
- (ખ) આપેલામાં કયો વાક્ય સાચો છે ?

(13) આપેલામાં કયો વાક્ય સાચો છે ?

- (ક) આપેલામાં કયો વાક્ય સાચો છે ?
- (ખ) આપેલામાં કયો વાક્ય સાચો છે ?

(14) આપેલામાં કયો વાક્ય સાચો છે ?

- (ક) આપેલામાં કયો વાક્ય સાચો છે ?
- (ખ) આપેલામાં કયો વાક્ય સાચો છે ?

(15) આપેલામાં કયો વાક્ય સાચો છે ?

- (ક) આપેલામાં કયો વાક્ય સાચો છે ?
- (ખ) આપેલામાં કયો વાક્ય સાચો છે ?

(16) આપેલામાં કયો વાક્ય સાચો છે ?

(17) આપેલામાં કયો વાક્ય સાચો છે ?

(18) આપેલામાં કયો વાક્ય સાચો છે ?

(19) આપેલામાં કયો વાક્ય સાચો છે ?

ENGLISH VERSION

- Instructions : (1) There are three questions in this paper.
(2) All questions are compulsory. Figures at the Right side indicate marks.
(3) Draw the labelled diagram wherever necessary.

- 1 (a) Describe in detail. (any two) 14
(1) Describe Aesthetic and Medicinal importance of Biodiversity.
(2) Describe Bio-geological classification of India by Biodiversity.
(3) Describe Types of Biodiversity

- (b) Write short notes. (any two) 6
(1) Importance of Genetical diversity
(2) Status of Biodiversity in Gujarat
(3) α , β and γ diversity

- 2 (a) Describe in detail. (Any two) 14
(1) Describe in detail the reasons of Loss of Biodiversity.
(2) Mention the Objects of red-list and give note of endangered species of India.
(3) Describe the In-Situ conservation of Biodiversity.

- (b) Short notes. (Attempt any two out of three) 6
(1) Ethical value of Biodiversity
(2) Benefits of Protected areas.
(3) National parks. 3

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- Short questions. 3
- (1) Which region shows average low species diversity? earth.
 - (2) _____ Ecosystem is the biggest ecosystem on earth.
 - (3) Mention the full form of WCU.
 - (4) How much long is costal line in India.
 - (5) Mention any two names of the Projects for conservation of Biodiversity.
 - (6) What is Group loss of Biodiversity ?
 - (7) What is biodiversity ?
 - (8) _____ protected areas are there in India.
 - (9) (A) 581 (B) 429 (C) 492 (D) 531
How many biosphere reserves area are there in India ?
 - (10) (A) 14 (B) 19 (C) 18 (D) 16
Write any two animals' names who are critically endangered.

- (અ) સંવસ્તર વર્ણવો : (બે મે મે)
- (૧) ભૂ-શાખા ક્ષેત્રની વર્ણવવામાં આવેલા મુખ્ય અંગો સમજાવો.
 - (૨) આવૃક્ષની કૃત્રિમ વર્ણવવામાં આવેલા મુખ્ય અંગો સમજાવો.
 - (૩) ચૈકોટીશીટ્સની કૃત્રિમ વર્ણવવામાં આવેલા મુખ્ય અંગો સમજાવો.

- (બ) કૃત્રિમીય લખો : (બે મે મે)
- (૧) માસલ કૃત્રિમીય વર્ણવવામાં આવેલા મુખ્ય અંગો સમજાવો.
 - (૨) વર્ણવો: સૌમ્યવૃક્ષની જાતો અને તેમની વર્ણવવામાં આવેલા મુખ્ય અંગો સમજાવો.
 - (૩) વર્ણવો: મકાઈના નર પુષ્પવિન્યાસ અને પરાગનયન.

- સૂચના :
- (૧) આ પ્રશ્નપત્રમાં કુલ ચાર પ્રશ્નો છે.
 - (૨) બધા પ્રશ્નો સરખાવાયા છે. જ્યારે બીજાની બંધ વાંચી દર્શાવે છે.
 - (૩) પ્રશ્નોમાં જેટલે જગ્યા આપી આકૃતિ દેવેલી.

Time : 3 Hours]

[Total Marks : 70

B. Sc. (Sem. IV) Examination
April/May - 2016
Botany : CC - BOT - 221

PO-403

Seat No. _____



ENGLISH VERSION

- Instructions :**
- (1) There are four questions in this paper.
 - (2) All questions are compulsory. Figures at the right side mention marks.
 - (3) Draw the labelled diagram where necessary.

1 (A) Describe briefly : (Any two) 14

- (1) Describe briefly on fleshy fruits with example.
- (2) Describe : Gametophyte phase in sunflower.
- (3) Describe : Male inflorescence and pollination in maize plant.

(B) Write short notes on : (Any two) 6

- (1) Hypanthodium type Inflorescence.
- (2) Inflorescence and florite of sunflower.
- (3) Female flowers of maize plant.

2 (A) Describe briefly: (Any two) 14

- (1) Classify the angiosperm families of yours syllabus on the base of Bentham-Hooker's classification.
- (2) Classify the family Malvaceae and describe the general characters, floral formula and floral diagram briefly.
- (3) Classify the family Euphorbiaceae and describe the general characters, floral formula and floral diagram briefly.

(B) Write short notes on : (Any two) 6

- (1) Classification with reasons and floral formula of family Myrtaceae.
- (2) Botanical name and importance of any two plant of family Iliaceae.

(3) General characters and floral formula of family Palmae.

3 (A) Describe briefly : (Any two) 14

- (1) Describe briefly on Sclerenchyma.
- (2) Describe briefly the theories of shoot apical organization.
- (3) Describe briefly the mechanical tissue in Nyctanthus stem and anomalous secondary grow in *Salvadora*.

(B) Write short notes on : (Any two)

- (1) Structure and function of Xylem.
- (2) Quiescent centre theory.
- (3) Draw only labelled diagram of Anomalous secondary growth in *Bignonia* stem.

4

Short questions.

10

- (1) Explain : Unfertilized fruit.
- (2) Give the example of septicial dehiscence fruit.
- (3) Write a type of phyllotaxy in sunflower plant. -
Maize plant leaf consists of long petiole. -
True / False
- (5) Give the botanical name of plant which consists of Epicallyx.
- (6) Give the botanical name of any two plants comes in family Rubiaceae.
- (7) Write name of family which consists of milky latex.
- (8) Definition : Tissue.
- (9) Who is given Korper-Kappe theory ?
- (10) Which plant is consists of I-gurder ?



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Seat No. _____

B. Sc. (Sem. IV) Examination

April/May - 2016

Mathematics : Paper - CC - MATH - 401

(Advanced Calculus)

Time : 3 Hours]

[Total Marks : 70

Instructions : (1) All questions are compulsory.
(2) The figures to the right indicate marks of the corresponding questions.

1 (a) Angle between radius vector and tangent 5

to a continuous curve $r = f(\theta)$ is ϕ and θ is

angle between radius vector and OX then

$$\tan \phi = r \cdot \frac{d\theta}{dr}$$

OR

5 (a) Prove that

$$\beta(m, n) = \frac{|m \cdot n|}{|m+n|}$$

15 (b) Attempt any three :

(1) Find the p -r equation of $r = a(1 - \cos \theta)$.

(2) Find the center of curvature of

$x^{2/3} + y^{2/3} = a^{2/3}$ and prove that evalu-

ate of the curve is

$$(x+y)^{2/3} + (x-y)^{2/3} = 2a^{2/3}$$

(4) Evaluate $\int_1^{x^2} \int_{x+y}^1 \int_0^{2y} x \, dx \, dy \, dz$

(3) Using polar co-ordinate, evaluate $\iint_R e^{-x^2-y^2} \, dx \, dy$, $R = \{(x,y) | x^2 + y^2 \leq a^2, x \geq 0, y \geq 0\}$

(2) $\int_1^{x+1} \int_1^0 f(x,y) \, dy \, dx$

Change the order of integration

(1) Find the volume of a sphere $x^2 + y^2 + z^2 = a^2$ using double integral.

(b) Attempt any three :
region between $y^2 = 2x$ and $x^2 = 2y$.

(a) Prove that $\iint_S 8xy \, dx \, dy = \frac{32}{3}$ where S is

OR

of $x^2 + y^2 = a^2$ in first quadrant.

(a) Prove that $\iint_S xy \, dx \, dy = \frac{a^4}{8}$. Where S is region

(4) Prove that $\int_0^\infty \frac{3^{-4x^2}}{\sqrt{x}} \, dx = \frac{4\sqrt{\log 3}}{\sqrt{\pi}}$

(3) Prove that $\int_{\frac{\pi}{2}}^0 \sqrt{\sin \theta} \, d\theta \times \int_{\frac{\pi}{2}}^0 \frac{\sqrt{\sin \theta}}{1} \, d\theta = \pi$

$$x^2 + y^2 + z^2 = 1.$$

Where S is surface of sphere

$$\iint_S \vec{F} \cdot \vec{n} \, ds = \frac{3}{4\pi} (a+b+c).$$

then prove that

(4) If $\vec{F} = (ax, by, cz)$, a, b, c are constants

boundary of ellipse $x^2 + 4y^2 = 4$.

$$\oint_C [(2x-y)dx + (x+3y)dy]$$

where C is the

(3) Verify Green's theorem

$A(1,1), B(1,2), C(2,2), D(2,1)$.

Where $C \square ABCD$ is square,

$$(2) \text{ Evaluate } \oint_C (x^2 + y^2) dx + (2x + y^2) dy.$$

a vector function.

Where ϕ is a Scalar function and \vec{f} is

$$\text{div}(\phi \vec{f}) = \phi \text{div} \vec{f} + \vec{f} \cdot \text{grad} \phi.$$

(1) Prove that

(b) Attempt any three :

15

(a) State and prove Green's theorem.

5

OR

(a) State and prove Stokes's theorem.

5

$$\left. \begin{aligned} x &= a \cos \theta \\ y &= b \sin \theta \end{aligned} \right\}, \text{ using Green theorem.}$$

(7) Find the area of ellipse

$$\text{div } \vec{F} = 3 \text{ and } \text{Curl } \vec{F} = \vec{0}.$$

(6) If $\vec{F} = (x, y, z)$ then prove that

$$\text{Curl } (\vec{f} + \vec{g}) = \text{Curl } \vec{f} + \text{Curl } \vec{g}.$$

(5) Prove that :

$$I = \int_0^5 \int_{2\pi}^{\pi} \int_0^{\theta} r^4 \sin \phi \, dr \, d\theta \, d\phi.$$

(4) Evaluate :

$$\beta(p, q) = \beta(p+1, q) + \beta(p, q+1).$$

(3) Prove that

$$(2) \text{ Find } S = \psi \text{ equation of } y = C \cdot \cosh \left(\frac{C}{x} \right).$$

$$y = \log \sec x \text{ at } (0, 0).$$

(1) Find the radius of curvature of

4 Attempt any five :



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B. Sc. (Sem. IV) Examination

April/May - 2016

Mathematics : CC - MATH - 402

(Advanced Linear Algebra)

Time : 3 Hours

[Total Marks : 70

Instructions : (1) All questions are compulsory.

(2) Figures to the right side indicate the marks of questions.

1 (a) If $A, B \in M^{n \times n}$ are invertible then

$(AB)^{-1} = B^{-1}A^{-1}$ and $(A^T)^{-1} = (A^{-1})^T$, where

A^T is transpose of A .
OR

(a) Explain : Row reduced echelon form and

prove that an $n \times n$ matrix A is non singular

(b) Attempt any two :
(1) Determine whether the matrix

$A = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 2 & 3 \\ -1 & 1 & 0 \end{bmatrix}$ is singular or non-singular.

- (1) If $\{f_1, f_2, f_3\}$ is dual basis of B where $B = \{(1, -1, 1), (1, 1, -1), (-1, 1, 1)\}$ is basis of R^3 , then find $f_1(x), f_2(x)$ and $f_3(x)$; when $x = (1, 0, 0)$.
- (b) Attempt any two :
 of V onto V^{**}
 on V^* also show that $x \rightarrow T_x$ is an isomorphism
 $T_x(f) = f(x), \forall f \in V^*$ is a linear functional
 the function T_x on V^* defined by
 over the field R . If $x \in V$ be any vector then
 (a) Let V be a finite dimensional vector space

12

8

OR

- (a) State and prove Schwartz inequality.
 vector - spaces R^4 and R^3

8

where considering the standard bases of

associated with the matrix $\begin{bmatrix} 1 & 1 & 2 & 3 \\ 1 & 0 & 1 & -1 \\ 1 & 2 & 0 & 0 \end{bmatrix}$,

- (3) Obtain the linear transformation by row reduction method.
 $2x + 5y + 2z - 3t = 3$
 $3x + 6y + 5z + 2t = 2$
 $4x + 5y + 14z + 14t = 11$
 $5x + 10y + 8z + 4t = 4$
- (2) Solve the system of equations :

is an eigen value of T^{-1} .

- (3) Define : Eigen value of a linear transformation. If T is invertible and λ is an eigen value of T then show that λ^{-1} is an eigen value of T^{-1} .
- (2) Prove that : The characteristic equations of similar matrices are equal.

eigen vectors of matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$

- (1) Find eigen values and corresponding eigen vectors of matrix A .
- (a) State and prove Cayley - Hamilton theorem. 8
- (b) Attempt any two : 12

OR

- (a) Let V be a vector space and $T \in L(V, V)$. The distinct eigen - vectors of T corresponding to distinct eigen values of T are linearly independent. 8

V and $y \in V$ then $\sum_{i=1}^n \langle y, x_i \rangle^2 \leq \|y\|^2$.

- (3) If $B = \{x_1, x_2, \dots, x_n\}$ is an orthonormal basis of n -dimensional inner product space V and $y \in V$ then $\sum_{i=1}^n \langle y, x_i \rangle^2 \leq \|y\|^2$.
- (2) Define : Inner product space. In an inner product space V if $\langle x, y \rangle = \|x\| \|y\| \Leftrightarrow x$ and y are linearly dependent.

$\langle x, y \rangle = \|x\| \|y\| \Leftrightarrow x$ and y are linearly dependent.

- (2) Define : Inner product space. In an inner product space V if $\langle x, y \rangle = \|x\| \|y\| \Leftrightarrow x$ and y are linearly dependent.

- Attempt any five :
- (1) Explain : Rank and nullity of a matrix.
 - (2) If x and y are two vectors of inner product space V then show that $\|x\| = \|y\|$ iff $\langle x+y, x-y \rangle = 0$.
 - (3) Define : Characteristic polynomial and minimal polynomial.
 - (4) Suppose $T: R^2 \rightarrow R^2$ is defined by $T(\alpha, \beta) = (\alpha + 5\beta, 3\alpha + \beta) \in R$ then find T^* .
 - (5) Define : Invertible matrix and Transpose of a matrix.
 - (6) Let V be a vector space and $T \in L(V, V)$. If λ is the union of the set $\{0\}$ and the set of all eigen vectors of T corresponding to the eigen value λ on T then V_λ is a subspace of V .



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Seat No. _____

B. Sc. (Sem. IV) Examination

April / May - 2016

- 1. ESMAT-22 : Business Mathematics - II
- 2. ES-31 : Business Mathematics - III

Time : 2 Hours]

[Total Marks : 50

1. ESMAT-22 : Business Mathematics - II

- 1 (a) For two events A and B prove that 5

$$P(A \cap B) = P(A) \cdot P(B/A)$$

OR

- (a) If A and B are events such that $A \subset B$ then 5

prove that

$$(i) P(B-A) = P(B) - P(A)$$

$$(ii) P(A) \leq P(B).$$

- (b) Attempt any four : 20

- (i) Find the probability of obtaining two heads in the toss of two unbiased coins when

- (a) at least one of the coins shows a head

- (b) second coin shows a head

- (ii) A bag contains 12 white and 8 red balls. If four balls are taken one after the other from the bag.

- (a) without replacement

- (b) with replacement

Find the probabilities that they are alternatively of different colour.

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- (iii) Two unbiased dice are tossed. Let w denotes the number on the first die and r denote the number on the second die. Let A be the event that $w + r \leq 4$ and B be the event that $w + r \leq 3$. Are A and B independent?
- (iv) A box contains 5 red, 6 white and 2 black balls. The balls are identical in all respect other than colour.
- (a) One ball is drawn from the box. Find the probability that the selected ball is black.
- (b) Two balls are drawn at random from the box. Find the probability that one ball is white and one is red.
- (v) If $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{4}$ and $P(A \cap B) = \frac{1}{6}$ then find $P(A \cup B)$, $P(A' \cap B')$ and $P(A'/B')$
- (vi) The probability (i) that A can solve a problem in statistics is $\frac{4}{5}$ (ii) that B can solve it is $\frac{2}{3}$ (iii) that C can solve it is $\frac{3}{7}$. If all of them try independently, find the probability that the problem will be solved.



Seat No. _____

PO-410

B. Sc. (Sem. IV) Examination

April / May - 2016

MI - 204 : Microbiology

(CC - Microbial Diversity)

Time : 3 Hours]

[Total Marks : 70

PART - A

Answer any five Multiple Choice Questions from the following : 10

1 Malaria caused by

- (A) Bacteria
- (B) Virus
- (C) Protozoa
- (D) Fungi

2 Virioids are _____

- (A) SS DNA
- (B) DS RNA
- (C) SS RNA
- (D) DS DNA

3 Biodiversity term coined by _____

- (A) Robert Whittaker
- (B) Harvey B. Lilly
- (C) Bergey
- (D) Walter G. Rosen

4 Bacteria which oxidize inorganic chemicals are

- (A) Heterotrophs
- (B) Chemolithotrophs
- (C) Both (A) and (D)
- (D) Chemoorganotrophs

5 The study of _____ is called mycology.

- (A) algae
- (B) protozoa
- (C) fungi
- (D) virus

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[Contd...

- 7 Define : Heterotrophs and phototrophs.
 - 6 Give the examples of beneficial algae.
 - 5 Enlist methods for cultivation of virus.
 - 4 Enlist cultural methods of biodiversity assessment.
 - 3 Give full name: RFLP, PCR.
 - 2 Define Lichens with example.
 - 1 Define : Ecosystem Biodiversity.
- Give very short answers on any five of the following : 10

PART- B

- 7 The type of diversity including all the different kinds of living things found in a certain habitat is called as
 - (A) Species diversity
 - (B) Genetic diversity
 - (C) Ecosystem diversity
 - (D) Population diversity
- 6 CIM stands for
 - (A) Confocal Light Microscope
 - (B) Confocal Laser Microscope
 - (C) Combined Laser Microscope
 - (D) Combined Light Microscope

- 6 Discuss the origin of life.
 - 5 Write note on the role of mol % G+C in assessment of biodiversity.
 - 4 Write note on Virus.
 - 3 Write note on Heterotrophic metabolism.
 - 2 Objectives for microscopic analysis in microbial diversity assessment.
 - 1 Economic Importance of Protozoa.
- Give answers on any **four** questions in brief : 16

PART - D

- 6 General properties Algae and Fungi.
 - 5 Write note on PCR in detail.
 - 4 Explain : Species Concept.
 - 3 Explain : Write note on Electron microscopy.
 - 2 Write a note on Diversity in ultra-structure of cell.
 - 1 Explain : Write note on Prions.
- Give answers on any **four** questions in brief : 16

PART - C

- Write short notes/answers on any **three** of the following : 18
- 1 Archaeal diversity.
 - 2 Discuss briefly role of lipid biomarkers and protein profiling in biodiversity assessment.
 - 3 Selective, differential and enrichment culture techniques as a tool for studying microbial diversity.
 - 4 Detail note on value of biodiversity.



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B. Sc. (Sem. IV) Examination

April / May - 2016

MI-205 : Microbiology

(Core Course - Food & Dairy Microbiology)

[Time : 3 Hours]

[Total Marks : 70]

Instruction : All questions are compulsory.

PART - A

Answer all questions :

10

1 Which of the following is not a food borne disease?
(A) Gastroenteritis (B) Amoebiasis
(C) Diarrhea (D) Malaria.

2 Kefir is produced from :
(A) Fruits (B) Milk
(C) Vegetables (D) Barley

3 Spirulina belongs to which group of microorganisms?
(A) Molds (B) Yeast
(C) Algae (D) Protozoa

4 Which of the following test is used to determine presence of Coliforms ?

(A) MBRT (B) MPN
(C) Acid fast staining (D) SPC

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[Contd...