

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc.

FOUNDATION COMPULSORY

ENGLISH

Syllabus/ scheme

Semester – 4

PROGRAM CODE : HNGU1008



Sem./CBCS/Grading pattern

w. e. f. June-2020


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SCHEME OF EXAMINATION

BACHALOR OF SCIENCE PROGRAMME

SEMSTER-IV

F C 403

- Q.1-(A) One long question with an internal option (from unit –I) (8)
- Q.1-(B) Attempt five short questions out of eight (from unit-I) (10)
- Q.2- Attempt five questions from each grammatical topic of unit II.
(Ten out of twelve) (10)
- Q.3 Letter writing Or Email Writing with internal option (7)




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B Sc Semester IV

Course Level Learning Outcomes:

To encourage students to learn and appreciate language through literature

To encourage and develop reading habits in Under Graduate Students.

To introduce Under Graduate students to important themes and issues

To enable students to learn basic grammar through the practice of prescribed topics

To enable students to write and respond to formal letters and Email

Course Content

Unit 1

Lesson 6 to 10

Glimpses - Macmillan

Unit 2

Grammar

Identification of Clauses

Modal Auxiliaries

Unit 3

Composition (Formal Letter and E Mail)

Letter of Inquiry/Complaint/Invitation

Recommended Reading

High School English Grammar- Wren and Martin

Contemporary English Grammar- David Green




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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

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Faculty of Science

B. Sc. Microbiology

Syllabus/ scheme

Sem. – 4



Sem./CBCS/Grading pattern

w. e. f. June-2020




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(11)

B.Sc. Microbiology (CBCS PATTERN) - Proposed curriculum
Semester-4

SEMESTER-4
MB-401 : FOOD AND DAIRY MICROBIOLOGY
(THEORY)

TOTAL HOURS: 60

CREDITS: 3

Unit 1

A. Foods as a substrate for microorganisms
Intrinsic and extrinsic factors that affect growth and survival of microbes in foods, natural flora and source of contamination of foods in general. No. of Hours: 10

B. Microbial spoilage of various foods
Principles, Spoilage of vegetables, fruits, meat, eggs, milk and butter, bread, canned Foods No. of Hours: 10

Unit 2

A. Principles and methods of food preservation
Principles, physical methods of food preservation: temperature (low, high, canning, drying), irradiation, hydrostatic pressure, high voltage pulse, microwave processing and aseptic packaging, chemical methods of food preservation: salt, sugar, organic acids, SO₂, nitrite and nitrates, ethylene oxide, antibiotics and bacteriocins No. of Hours: 12

B. Fermented foods
Dairy starter cultures, fermented dairy products: yogurt, acidophilus milk, kumiss, kefir, dahi and cheese, other fermented foods: dosa, sauerkraut, soy sauce and tampeh, Probiotics: Health benefits, types of microorganisms used, probiotic foods available in market. No. of Hours: 10

Unit 3

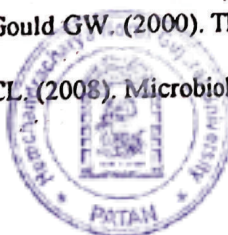
A. Food borne diseases (causative agents, foods involved, symptoms and preventive measures) No. of Hours: 14

Food intoxications: *Staphylococcus aureus*, *Clostridium botulinum* and mycotoxins; Food infections: *Bacillus cereus*, *Vibrio parahaemolyticus*, *Escherichia coli*, Salmonellosis, Shigellosis, *Yersinia enterocolitica*, *Listeria monocytogenes* and *Campylobacter jejuni*

B. Food sanitation and control No. of Hours: 6
HACCP, Indices of food sanitary quality and sanitizers

SUGGESTED READINGS

1. Adams MR and Moss MO. (1995). Food Microbiology. 4th edition, New Age International (P) Limited Publishers, New Delhi, India.
2. Banwart JM. (1987). Basic Food Microbiology. 1st edition. CBS Publishers and Distributors, Delhi, India.
3. Davidson PM and Brannen AL. (1993). Antimicrobials in Foods. Marcel Dekker, New York.
4. Dillion VM and Board RG. (1996). Natural Antimicrobial Systems and Food Preservation. CAB International, Wallingford, Oxon.
5. Frazier WC and Westhoff DC. (1992). Food Microbiology. 3rd edition. Tata McGraw-Hill Publishing Company-Ltd, New Delhi, India.
6. Gould GW. (1995). New Methods of Food Preservation. Blackie Academic and Professional, London.
7. Jay JM, Loessner MJ and Golden DA. (2005). Modern Food Microbiology. 7th edition, CBS Publishers and Distributors, Delhi, India.
8. Lund BM, Baird Parker AC, and Gould GW. (2000). The Microbiological Safety and Quality of Foods. Vol. 1-2, ASPEN Publication, Gaithersberg, MD.
9. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education.



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Semester-4

SEMESTER-4

MB-402 : ENVIRONMENTAL MICROBIOLOGY (THEORY)

TOTAL HOURS: 60

CREDITS: 3

Unit 1

No. of Hours: 20

A. Microorganisms and their Habitats.

Structure and function of ecosystems Terrestrial Environment: Soil profile and soil microflora Aquatic Environment: Microflora of fresh water and marine habitats Atmosphere: Aeromicroflora and dispersal of microbes

B. Animal Environment: Microbes in/on human body (Microbiomics) & animal (ruminants) body. Extreme Habitats: Extremophiles: Microbes thriving at high & low temperatures, pH, high hydrostatic & osmotic pressures, salinity, & low nutrient levels. Microbial succession in decomposition of plant organic matter

Unit 2

No. of Hours: 20

A. Microbial Interactions

Microbe interactions: Mutualism, synergism, commensalism, competition, amensalism, parasitism, predation Microbe-Plant interaction: Symbiotic and non symbiotic interactions Microbe-animal interaction: Microbes in ruminants, nematophagus fungi and symbiotic luminescent bacteria

B. Biogeochemical Cycling

Carbon cycle: Microbial degradation of cellulose, hemicelluloses, lignin and chitin Nitrogen cycle: Nitrogen fixation, ammonification, nitrification, denitrification and nitrate reduction Phosphorus cycle: Phosphate immobilization and solubilisation Sulphur cycle: Microbes involved in sulphur cycle Other elemental cycles: Iron and manganese

Unit 3 Waste Management

No. of Hours: 20

A. Solid Waste management: Sources and types of solid waste, Methods of solid waste disposal (composting and sanitary landfill) Liquid waste management: Composition and strength of sewage (BOD and COD), Primary, secondary (oxidation ponds, trickling filter, activated sludge process and septic tank) and tertiary sewage treatment

B. Microbial Bioremediation

Principles and degradation of common pesticides, organic (hydrocarbons, oil spills) and inorganic (metals) matter, biosurfactants

C. Water Potability

Treatment and safety of drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms (b) Membrane filter technique and (c) Presence/absence tests

SUGGESTED READINGS

1. Atlas RM and Bartha R. (2000). Microbial Ecology: Fundamentals & Applications. 4th edition. Benjamin/Cummings Science Publishing, USA
2. Madigan MT, Martinko JM and Parker J. (2014). Brock Biology of Microorganisms. 14th edition. Pearson/ Benjamin Cummings
3. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition. Academic Press
4. Okafor, N (2011). Environmental Microbiology of Aquatic & Waste systems. 1st edition, Springer, New York
5. Singh A, Kuhad, RC & Ward OP (2009). Advances in Applied Bioremediation. Volume 17, Springer-Verlag, Berlin Hedeilberg
6. Barton LL & Northup DE (2011). Microbial Ecology. 1st edition, Wiley Blackwell, USA Campbell RE. (1983). Microbial Ecology. Blackwell Scientific Publication, Oxford, England.
7. Coyne MS. (2001). Soil Microbiology: An Exploratory Approach. Delmar Thomson Learning.
8. Lynch JM & Hobbie JE. (1988). Microorganisms in Action: Concepts & Application in Microbial Ecology. Blackwell Scientific Publication, U.K.
9. Martin A. (1977). An Introduction to Soil Microbiology. 2nd edition. John Wiley & Sons Inc. New York & London.
10. Stolp H. (1988). Microbial Ecology: Organisms Habitats Activities. Cambridge University Press, Cambridge, England.
11. Subba Rao NS. (1999). Soil Microbiology. 4th edition. Oxford & IBH Publishing Co. New Delhi.
12. Willey JM, Sherwood LM, and Woolverton CJ. (2013). Prescott's Microbiology. 9th edition. McGraw Hill Higher Education.



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B.Sc. Microbiology (CBCS PATTERN) – Proposed curriculum
Semester-4

13

TOTAL HOURS: 60

SEMESTER –4 (PRACTICALS)

CREDITS: 4

1. Isolation of microbes (bacteria & fungi) from soil (28°C & 45°C).
2. Isolation of microbes (bacteria & fungi) from rhizosphere and rhizoplane.
3. Assessment of microbiological quality of water.
4. Determination of BOD of waste water sample.
5. Isolation of *Rhizobium* from root nodules.
6. MBRT of milk samples and their standard plate count.
7. Alkaline phosphatase test to check the efficiency of pasteurization of milk.
8. Isolation of any food borne bacteria from food products.
9. Isolation of spoilage microorganisms from spoiled vegetables/fruits.
10. Isolation of spoilage microorganisms from bread.
11. Preparation of Yogurt/Dahi.



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B.Sc. Microbiology (CBCS PATTERN) – Proposed curriculum

Semester-4

SUBJECT ELECTIVE

MB-SE-401 : FOOD FERMENTATION TECHNIQUES (THEORY)

CREDITS: 2

TOTAL HOURS: 30

Unit 1

No of Hours: 4

A. Fermented Foods

Definition, types, advantages and health benefits

B. Milk Based Fermented Foods

Dahi, Yogurt, Buttermilk (Chach) and cheese: Preparation of inoculums, types of microorganisms and production process

C. Grain Based Fermented Foods No of Hours: 6

Soy sauce, Bread, Idli and Dosa: Microorganisms and production process

Unit 2

A. Vegetable Based Fermented Foods No of Hours: 4

Pickels, Saeurkraut: Microorganisms and production process

B. Fermented Meat and Fish No of Hours: 4

Types, microorganisms involved, fermentation process

C. Probiotic Foods No of Hours: 4

Definition, types, microorganisms and health benefits

Suggested Readings

1. Hui YH, Meunier-Goddik L, Josephsen J, Nip WK, Stanfield PS (2004) Handbook of food and fermentation technology, CRC Press
2. Holzapfel W (2014) Advances in Fermented Foods and Beverages, Woodhead Publishing.
3. Yadav JS, Grover, S and Batish VK (1993) A comprehensive dairy microbiology, Metropolitan
4. Jay JM, Loessner MJ, Golden DA (2005) Modern Food Microbiology, 7th edition. Springer



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Faculty of Science

B. Sc. STATISTICS

Syllabus/ scheme

Semester – 4



Sem./CBCS/Grading pattern

w. e. f. June-2020



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B.Sc SEM - IV

Programme Name	Bachelor of Science
Semester	Fourth
Paper No.	CC – STAT – 401
Course name	Distribution Theory – 2
Course Type	Core
Effective From	December – 2021

Unit No.	Content	Marks	Credit
1.	Discrete Distribution: Hypergeometric distribution, Geometric distribution, Negative binomial distribution and their properties.	23	1
2.	Continuous distribution: Weibull distribution (two parameter case only), Laplace distribution, Cauchy distribution, Lognormal distributions. Normal and Bivariate Normal Distributions with their properties	23	1
3.	Characteristic function with its properties, Inversion Theorem with proof, use of inversion theorem in deriving different discrete and continuous distributions; Definition of Convergence, Convergence in probability and Convergence in distribution, weak law of large numbers: Chebyshev's form and Bernoulli form and examples. Central Limit Theorem (proof of Lindberg Levy's form only), Statement of Liapounoff's form of CLT. Examples based on CLT.	24	1

References :

1. Mukhopadhyay, P. (2006): Mathematical Statistics, 3-ed., Books and Allied(P) Ltd.
2. Mukhopadhyay, N.(2000): Probability and Statistical inference, Marcel Dekker.
3. Rohatgi, V.K. & A.K. Md.E. Saleh (2001) : An Introduction to Probability & Statistics, John Wiley, 2nd Edition
4. Biswas, S. and Sriwastav, G. L. (2011): Mathematical Statistics- a Textbook, Narosa.
5. Ross, S.M.: Introduction to Probability and Statistics for Engineers and Scientists, Elsevier.
6. Gupta, S. C. and Kapoor, V. K. (2005): Fundamental of Mathematical Statistics, Sulatan Chand and Sons.




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B.Sc SEM – IV

Programme Name	Bachelor of Science
Semester	Fourth
Paper No.	CC – STAT – 402
Course name	Applied Statistics
Course Type	Core
Effective From	December – 2021

Unit No.	Content	Marks	Credit
1.	Index numbers Concept of index numbers, use of index numbers, Construction of index numbers, concept of price, quantity and value index numbers, Fixed base and chain based index numbers – concept and uses with examples, Whole sale price index numbers and its economic importance. Aggregate and weighted index numbers - Laspeyer, Paasche's, Fisher's and Marshall- Edgeworth formula of index numbers. Tests for index numbers – Circular test, Time Reversal Test and Factor Reversal Test, Ideal index number, Construction of cost of living index number, Brief idea about Base shifting and base splicing and its application.	24	1
2.	Time series: Idea of time series, Components of time series, additive and multiplicative models of time series, measurement of trend by method of moving average, polynomial up to second degree. Computation of seasonal indices using ratio to trend method and link relative methods.	23	1
3.	Vital Statistics: Brief note on vital statistics, Role of vital events, methods of data collection on vital events, Measurement of mortality – Crude Death Rate, Specific Death Rate, Standardized Death Rate. Measurements of fertility – Crude Birth Rate, General Fertility Rate, Total Fertility Rate, Gross and Net Reproduction Rate. Concept of life table, meaning and interrelationships of different terms of life table, uses of life table.	23	1

References :

1. Gupta, S. C. And Kapoor, V. K.(2005): Fundamentals of Applied Statistics, Sultan Chand & Sons.
2. Mukhopadhyay P. (1999): Applied Statistics
3. Gupta, S. C.(2005): Business Statistics, Himalaya Publishing House.




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B.Sc SEM – IV

Programme Name	Bachelor of Science
Semester	Fourth
Paper No.	PC – STAT – 401
Course name	Distribution Theory – 2
Course Type	Core
Effective From	December – 2021

Unit No.	Content	Marks	Credit
1.	Part - A (Manual) 1. Drawing of random samples from geometric and negative binomial distributions. 2. Fitting of geometric, negative binomial and log normal distributions. 3. Drawing pf random samples from Weibull, Laplace, Normal. Log normal and Bivariate normal distributions. 4. Fitting of Normal Distribution 5. Application of Central Limit Distribution	25	1
2.	Part - B (MS Excel) 1. Drawing of random samples from geometric and negative binomial distributions. 2. Drawing pf random samples from Laplace , Log normal and Bivariate normal distributions. 3. Fitting of geometric, negative binomial, normal and log normal distributions.	25	1




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B.Sc SEM : IV

Programme Name	Bachelor of Science
Semester	Fourth
Paper No.	PC – STAT – 402
Course name	Applied Statistics
Course Type	Core
Effective From	December – 2021

Unit No.	Content	Marks	Credit
1.	Part - A (Manual) 1. Problems on fixed and chain based index numbers 2. Calculation of indices using Laspeyer's, Paasche, Fisher's and Marshal Edgeworth formula. 3. Tests of Index numbers for Laspeyer's, Paasche, Fisher's and Marshal Edgeworth formula. 4. Calculation of cost of living index number. 5. Time series - calculation of trend using least square and moving average methods. Calculation of seasonal indices using ratio to trend and link and link relative methods. 6. Calculation of mortality and fertility rates. 7. Problems based on life tables.	25	1
2.	Part - B (MS Excel) 1. Calculation of indices using Laspeyer's, Paasche, Fisher's and Marshal Edgeworth formula. 2. Tests of Index numbers for Laspeyer's, Paasche, Fisher's and Marshal Edgeworth formula. 3. Calculation of cost of living index number. 4. Time series - calculation of trend using least square and moving average methods, Calculation of seasonal indices using ratio to trend and link and link relative methods. 5. Calculation of mortality and fertility rates.	25	1




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BSC. SEM – IV

Programme Name	Bachelor of Science
Semester	Fourth
Course No	ES – STAT – 22
Course Name	Introduction to Operations Research
Course Type	Elective Opt
Effective From	December – 2021

Unit no	Content	Marks	Credit
1.	Linear Programming Linear Programming as an Optimization Technique, Structure of an L.P. Problem, Formulations of L.P. Problem, Graphical Method, Simplex method for Maximization problem, Big-M, Method for Minimization case, Degeneracy, Unbounded, Infeasible and Alternative Solution cases, Advantages and Limitations of Linear Programming, Applications of L.P.: Production planning problem, Advertising Media Selection Problem, Oil Refinery Blending Problem, Product Mix problem	25	1
2.	Transportation Problem and Assignment Problem Transportation Model, Formulation of Transportation Problem as an L.P. model, Vogel's approximation method, Modified Distribution Method, Optimality Tests, Degeneracy in T.P., Unbalanced T.P., Assignment Problem : Formulation, Hungarian Method, Constrained Assignment Problem, Applications of Transportation and Assignment Problems, Travelling Salesman Problem	25	1

References

1. Vohra N.D, Quantitative Techniques in Management, Tata Mc Graw Hill, New Delhi
2. J.K Sharma, Operations Research Theory and Applications, Macmillan India Ltd.,




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