HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc.

FOUNDATION COMPULSORY

ENGLISH

Syllabus/ scheme

Semester – 3

PROGRAM CODE : HNGU1008

Sem./CBCS/Grading pattern

w. e. f. June-2020

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SCHEME OF EXAMINATION

BACHALOR OF SCIENCE PROGRAMME

SEMSTER-III

F C 303

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 Précis Writing **(7)**

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B Sc Semester III

Course Level Learning Outcomes:

To encourage students to learn and appreciate language through Short Stories/Essays
To encourage and develop reading habits in Under Graduate Students
To develop abilities to comprehend passages and compose short summaries
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 comprehend short passages and compose précis so as to develop writing skills

Course Content:

Unit 1

Lesson 1-5

Glimpses - Macmillan

Unit 2

Grammar
Voice (Active to Passive)
Use Adverb /Adjective

Unit 3

Comprehension and Composition
Précis Writing

Recommended Reading

High School English Grammar- Wren and Martin
Contemporary English Grammar- David Green

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Faculty of Science

B. Sc. Microbiology

Syllabus/ scheme

Sem. – 3

Sem./CBCS/Grading pattern

w. e. f. June-2020

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

Semester-3

MB-301: BIOCHEMISTRY (THEORY)

TOTAL HOURS: 60 **CREDITS: 3**

Unit 1

No. of Hours: 10

A. Bioenergetics

First and second laws of Thermodynamics. Definitions of Gibb's Free Energy, enthalpy,and Entropy and mathematical relationship among them, Standard free energy change and equilibrium constant Coupled reactions and additive nature of standard free energy change, Energy rich compounds: Phosphoenolpyruvate, 1,3-Bisphosphoglycerate, Thioesters, ATP

No. of Hours: 10

B. Carbohydrates

Families of monosaccharides: aldoses and ketoses, trioses, tetroses, pentoses, and hexoses. Stereo isomerism of monosaccharides, epimers, Disaccharides; concept of reducing and non-reducing sugars, occurrence and Haworth projections of maltose, lactose, and sucrose, Polysaccharides, storage polysaccharides, starch and glycogen.

Unit 2

No. of Hours: 10

A. Lipids

Definition: and major classes of storage and structural lipids. Storage lipids. Fatty acids structure and functions. Essential fatty acids. Triacyl glycerols structure, functions and properties. Saponification . Phosphoglycerides: Sphingolipids: sphingosine, ceramide. Lipid functions: cell signals, cofactors, prostaglandins, Introduction of lipid micelles, monolayers, bilayers

No. of Hours: 10

B. Proteins

Functions of proteins, Primary structures of proteins: Amino acids, the building blocks of proteins. General formula of amino acid and concept of zwitterion. Classification, biochemical structure and notation of standard protein amino acids. Structure levels of structure of proteins: Peptide unit and its salient features. The alpha helix, the beta pleated sheet and their occurrence in proteins, Tertiary and quaternary structures of proteins. Forces holding the polypeptide together. Human haemoglobin structure, Quaternary structures of proteins

Unit 3 .

No. of Hours: 20

Enzymes

Structure of enzyme: Apoenzyme and cofactors, prosthetic group-TPP, coenzyme NAD,metal cofactors, Classification of enzymes, Mechanism of action of enzymes: active site, transition state complex and activation energy. Lock and key hypothesis, and Induced Fit hypothesis. Significance of hyperbolic, double reciprocal plots of enzyme activity, Km, and allosteric mechanism Definitions of terms – enzyme unit, specific activity and turnover number, Multienzyme complex : pyruvate dehydrogenase; isozyme: lactate dehydrogenase, Effect of pH and temperature on enzyme activity. Enzyme inhibition: competitive- sulfa drugs; non-competitive-heavy metal salts

SUGGESTED READING

1. Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning
2. Campbell, PN and Smith AD (2011) Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone
3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman
4. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company
5. Nelson DL and Cox MM (2008) **Lehninger Principles of Biochemistry**, 5th Edition., W.H. Freeman and Company,
6. Willey MJ, Sherwood, LM & Woolverton C J (2013) Prescott, Harley and Klein's Microbiology by. 9th Ed., McGrawHill
7. Biochemistry by JL Jain(S chand P.)

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

Semester-3

MB-302: Cell Biology (THEORY)

TOTAL HOURS: 60 **CREDITS: 3**

Unit 1 Structure and organization of Cell, **No. of Hours: 20**

Cell Organization – Eukaryotic (Plant and animal cells) and prokaryotic Plasma membrane: Structure and transport of small molecules, Cell Wall: Eukaryotic cell wall, Extra cellular matrix and cell matrix interactions, Cell-Cell Interactions - adhesion junctions, tight junctions, gap junctions, and plasmodesmata (only structural aspects) Mitochondria, chloroplasts and peroxisomes Cytoskeleton: Structure and organization of actin filaments, association of actin filaments with plasma membrane, cell surface protrusions, intermediate filaments, microtubules

Unit 2 Protein Sorting and Transport **No. of Hours: 20**

Ribosomes, Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing and quality control in ER, smooth ER and lipid synthesis, export of proteins and lipids Golgi Apparatus – Organization, protein glycosylation, protein sorting and export from Golgi Apparatus Lysosomes

Unit 3

A. Nucleus **No. of Hours: 07**

Nuclear envelope, nuclear pore complex and nuclear lamina Chromatin – Molecular organization Nucleolus

B. Cell Cycle, Cell Death and Cell Renewal **No. of Hours: 07**

Eukaryotic cell cycle, Mitosis and Meiosis

C. Cell Signalling **No. of Hours: 06**

Signalling molecules and their receptors Function of cell surface receptors Pathways of intra-cellular receptors – Cyclic AMP pathway, cyclic GMP and MAP kinase pathway

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Semester-3

SEMESTER –3 (PRACTICALS)

TOTAL HOURS: 60 **CREDITS: 4**

BIOCHEMISTRY

1 Properties of water, Concept of pH and buffers, preparation of buffers and Numerical problems to explain the concepts

2 Qualitative/Quantitative tests for carbohydrates, reducing sugars, non reducing sugars

3 Qualitative/Quantitative tests for lipids and proteins

4 Study of protein secondary and tertiary structures with the help of models

5 Study of enzyme kinetics – calculation of *V*max , Km, Kcat values

6 Study effect of temperature, pH and Heavy metals on enzyme activity

Cell Biology

7 Study a representative plant and animal cell by microscopy.

8 Cytochemical staining of DNA – Feulgen method

9 Identification and study of cancer cells by photomicrographs.

10 Study of different stages of Mitosis.

11 Study of different stages of Meiosis.

Ref: Voet,D. and Voet J.G (2004) Biochemistry 3rd edition, John Wiley and Sons,

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Semester-3

SUBJECT ELECTIVE

MB-SE-301 : INSTRUMENTATION AND BIOTECHNIQUES (THEORY)

TOTAL HOURS: 30 **CREDITS: 2**

Unit 1.

A. Chromatography **No. of Hours: 8**

Principles and applications of paper chromatography (including Descending and 2-D), Thin layer chromatography. Column packing and fraction collection. Gel filtration chromatography, ion-exchange chromatography and affinity chromatography, GLC, HPLC.

B. Electrophoresis **No. of Hours: 7**

Principle and applications of native polyacrylamide gel electrophoresis, SDS- polyacrylamide gel electrophoresis, 2D gel electrophoresis, Isoelectric focusing, Agarose gel electrophoresis.

Unit 2

A. Spectrophotometry **No. of Hours: 8**

Principle and use of study of absorption spectra of biomolecules. Analysis of biomolecules using UV and visible range. Colorimetry and turbidometry.

B. Centrifugation **No. of Hours: 7**

Preparative and analytical centrifugation, fixed angle and swinging bucket rotors. RCF and sedimentation coefficient, differential centrifugation, density gradient centrifugation and ultracentrifugation.

SUGGESTED READINGS

1. Wilson K and Walker J. (2010). Principles and Techniques of Biochemistry and Molecular Biology. 7th Ed., Cambridge University Press.
2. Nelson DL and Cox MM. (2008). Lehninger Principles of Biochemistry, 5th Ed., W.H. Freeman and Company.
3. Willey MJ, Sherwood LM & Woolverton C J. (2013). Prescott, Harley and Klein's Microbiology. 9th Ed., McGraw Hill.
4. Karp G. (2010) Cell and Molecular Biology: Concepts and Experiments. 6th edition. John Wiley & Sons. Inc.
5. De Robertis EDP and De Robertis EMF. (2006). Cell and Molecular Biology. 8th edition. Lipincott Williams and Wilkins, Philadelphia.
6. Cooper G.M. and Hausman R.E. (2009). The Cell: A Molecular Approach. 5th Edition. ASM Press & Sunderland, Washington D.C., Sinauer Associates, MA.
7. Nigam A and Ayyagari A. 2007. Lab Manual in Biochemistry, Immunology and Biotechnology. Tata McGraw Hill.

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Faculty of Science

B. Sc. STATISTICS

Syllabus/ scheme

Semester – 3

Sem./CBCS/Grading pattern

w. e. f. June-2020

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B.SC. SEM-III

Programme Name	Bachelor of Science
Semester	Third
Paper No.	CC – STAT – 301
Course name	Distribution Theory – 1
Course Type	Core
Effective From	June – 2021

Unit No.	Content	Marks	Credit
1.	**Discrete Distribution and their properties** Uniform (Rectangular), Bernoulli distribution, Binomial distribution, Poisson distribution. Truncated Binomial distribution (Truncated at X=0), Truncated Poisson distribution (Truncated at X=0). **Continuous distributions and their properties:** Uniform (Rectangular) distribution, beta type I and type II distributions, exponential distribution, gamma distribution.	24	1
2.	**Distributions of functions of one and two dimensional random variables** Basic idea and concept of Jacobian in derivation of distribution of function of random variables use of Jacobian in distribution deriving distribution of function of two random variables, General form of distribution of sum of two independent random variables, difference between two independent random variables, product of two independent random variables, quotient (ratio) of two independent random variables.	23	1
3.	**Order Statistics and Compound distribution:** Definition and application of order statistics, distribution of the smallest and the largest ordered statistics, Joint distribution of the smallest and largest ordered statistics (statement only), Concept and distribution of sample range, Related examples from uniform U(a,b) distribution and exponential distribution, Definition of compound distribution, compound distribution of Poison and Gamma, Binomial and Poisson, binomial and beta type I distributions.	23	1

References :

1. Mukhopadhyay, P. (2006): Mathematical Statistics, 3-ed., Books abd 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 – III

Programme Name	Bachelor of Science
Semester	Third
Paper No.	CC – STAT – 302
Course name	Descriptive Statistics – 2
Course Type	Core
Effective From	June – 2021

Unit No.	Content	Marks	Credit
1.	Bivariate data, plotting of bivariate data, Principle of Least squares, fitting of Linear, Parabolic, exponential and geometric curves; Scatter diagram, Product moment correlation coefficient and its properties, coefficient of determination, rank correlation, correlation ratio, concept of regression, fitting of linear regression and related results.	24	1
2.	Concept of partial and multiple correlation, Regression in three variables, their measures and related results.	23	1
3.	Independence and association of attributes, various measures of association for two way and three way classified data.	23	1

References :

1. Mukhopadhyay, P. (2006): Mathematical Statistics, 3-ed., Books abd 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 - III

Programme Name	Bachelor of Science
Semester	Third
Paper No.	PC – STAT – 301
Course name	Distribution Theory – 1
Course Type	Core
Effective From	June – 2021

Unit No.	Content	Marks	Credit
1.	**Part-A (Manual)** 1. Drawing of random sample from Binomial and Poisson distributions 2. Drawing of random sample from Normal, Beta type-I and II, Exponential, Gamma distributions. 3. Fitting of Binomial and Poisson distributions. 4. Fitting of truncated Binomial and Poisson distributions. 5. Fitting of normal distribution. 6. Fitting of Linear, Parabolic, exponential and geometric curves;	**25**	**1**
2.	**Part-B (MS Excel)** 1. Drawing of random sample from Binomial and Poisson distributions 2. Drawing of random sample from Normal, Beta type-I and II, Exponential, Gamma distributions. 3. Fitting of Binomial and Poisson distributions. 4. Fitting of truncated Binomial and Poisson distributions. 5. Fitting of normal distribution. 6. Fitting of Linear, Parabolic, exponential and geometric curves;	**25**	**1**

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B.Sc, SEM - III

Programme Name	Bachelor of Science
Semester	Third
Paper No.	PC – STAT – 302
Course name	Descriptive Statistics – 2
Course Type	Core
Effective From	June – 2021

Unit No.	Content	Marks	Credit
1.	**Part-A (Manual)** 1. Correlation and regression. 2. Rank correlation and correlation ratio. 3. Multiple and partial correlation and regression. 4. Association of attributes.	25	1
2.	**Part-B (MS Excel)** 1. Correlation and regression. 2. Rank correlation and correlation ratio. 3. Multiple and partial correlation and regression. 4. Association of attributes.	25	1

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BSC. SEM – III

Programme Name	Bachelor of Science
Semester	Third
Course No	ES – STAT – 21
Course Name	Statistical Quality Control
Course Type	Elective Opt
Effective From	June – 2021

Unit no	Content	Marks	Credit
1.	**Statistical Quality Control – 1** General theory of control charts, causes of variation in quality control limit. Summary of out of control criteria and theory of runs. Control charts for variables only for $\bar{X}$ bar and R charts and its numerical examples	25	1
2.	**Statistical Quality Control – 2** Charts for Attributes P, np and c charts, comparison of control charts and its applications	25	1

References

1. Business Statistics by H.R. Vyas and others By Sudhir Prakashan, Ahmedabad.
2. Hooda R.P. : Statistics for Business and Economics, Macmillan, New Delhi.
3. Levin and Rubin : Statistics of Management, Prentice – Hall of India, New Delhi

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