

J.S.S. BANASHANKARI ARTS, COMMERCE AND SHANTIKUMAR GUBBI SCIENCE COLLEGE, VIDYAGIRI, DHARWAD

Affiliated to Karnatak University, Dharwad

Accredited with 'A' Grade in last three cycles



Fourth Cycle NAAC Accreditation SELF STUDY REPORT (SSR)

≡ CRITERION - I ≡

1.2.1 (Q_nM)

**BIO-TECHNOLOGY
(CBCS)**



Submitted to
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL, BENGALURU



KARNATAK UNIVERSITY, DHARWAD
ACADEMIC (S&T) SECTION
 ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ
 ವಿದ್ಯಾಮಂಡಳ (ಎಸ್&ಟಿ) ವಿಭಾಗ



Tele: 0836-2215224
 e-mail: academic.st@kud.ac.in
 Pavate Nagar, Dharwad-580003
 ಪಾವಟೆ ನಗರ, ಧಾರವಾಡ - 580003

NAAC Accredited
 'A' Grade 2014

website: kud.ac.in

No. KU /Aca(S&T)/ RIH-290/CBCS/2020-21/ 315

Date: 13 AUG 2020

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2020-21ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸುಗಳಿಗೆ 1 ಮತ್ತು 2ನೇ ಸೆಮಿಸ್ಟರ್ ಸಿ.ಬಿ.ಸಿ.ಎಸ್. ಮಾದರಿಯ ಪಠ್ಯಕ್ರಮವನ್ನು ಅಳವಡಿಸಿರುವ ಕುರಿತು.

- ಉಲ್ಲೇಖ: 1. DO No. 1-1/2016(SECY), dt. 10.08.2016.
 2. Academic Council Res. No. 2, 21.05.2020.
 3. KU/Aca(S&T)/RIH-194/20-21/71, dt. 08.06.2020.
 4. KU/VCS/2020-21, dt. 11.08.2020.
 5. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ 13.08.2020.

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳಿಗೆ ಸಂಬಂಧಿಸಿದಂತೆ, 2020-21ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸುಗಳ 1 ಮತ್ತು 2ನೇ ಸೆಮಿಸ್ಟರ್‌ಗಳಿಗೆ ಸಿ.ಬಿ.ಸಿ.ಎಸ್. ಮಾದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದನೆಯನ್ನು (Pending Approval of Academic Council Meeting) ನಿರೀಕ್ಷೆಯಲ್ಲಿರಿಸಿ ಅಳವಡಿಸಲಾಗಿದೆ.

ಮುಂದುವರೆದು, ಈ ಮೇಲಿನ ಸಿ.ಬಿ.ಸಿ.ಎಸ್. ಪಠ್ಯಕ್ರಮವು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ www.kud.ac.in ದಲ್ಲಿ ಬಿತ್ತರಿಸಲಾಗಿದೆ ಎಂದು ಈ ಮೂಲಕ ತಿಳಿಸಲಾಗಿದೆ.

(Handwritten signature and date: 13/08/2020)
 (ಡಾ. ಹನುಮಂತಪ್ಪ ಕೆ.ಟಿ)
 ಕುಲಸಚಿವರು

ಗೆ,

ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಎಲ್ಲ ಅಧೀನ ಹಾಗೂ ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ.

ಪ್ರತಿ ಮಾಹಿತಿಗಾಗಿ: ಡೀನರು, ಕಲಾ, ಸಮಾಜ ವಿಜ್ಞಾನ, ವಿಜ್ಞಾನ ಹಾಗೂ ತಂತ್ರಜ್ಞಾನ, ವಾಣಿಜ್ಯ, ಕಾನೂನು, ಶಿಕ್ಷಣ ಮತ್ತು ಮ್ಯಾನೇಜ್‌ಮೆಂಟ್ ನಿಖಾಯ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

ಪ್ರತಿ:

1. ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕುಲಪತಿಗಳ ಕಾರ್ಯಾಲಯ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
2. ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕುಲಸಚಿವರ ಕಾರ್ಯಾಲಯ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
3. ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕುಲಸಚಿವರು(ಮೌಲ್ಯಮಾಪನ) ಕಾರ್ಯಾಲಯ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
4. ನಿರ್ದೇಶಕರು, ಇಂಟರನೆಟ್ ಸೆಕ್ಷನ್, ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
5. ಅಧೀಕ್ಷಕರು, ಸಿಡಿಪಿ (ಸಂಯೋಜನೆ) ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ

SEMESTER I
CORE COURSE: BIOTECHNOLOGY
PAPER BT-1.1 CELL BIOLOGY AND GENETICS
(Credits: Theory-4, Practicals-2)
THEORY
TOTAL HOURS ALLOTTED -60

1. **General Introduction of cell biology:** Historical perspectives, the Cell Theory, Ultra structure of plant and Animal cell. Different types of cells (plant and Animal). Bone, Muscle and nerve cell structures and functions in brief. **(7hrs)**
2. **Ultra structure of cell organelles:** Cell wall, Plasma membrane, Mitochondria, Chloroplast, Ribosomes, Golgi complex, Endoplasmic reticulum. Nucleus, Lysosomes. Peroxisomes, Vacuole. Cytosol and Cytoskeletal structures. **(8hrs)**
3. **Chromosomes:** Discovery Morphology and structural organization: number, size and types, Chromosomal morphology and classification, fine structure and models, heterochromatin and euchromatin, giant chromosomes (Salivary gland and Lampbrush) **(4 hrs)**
4. **Cell Division & Motility:** Cell cycle, mitosis and meiosis, mitotic apparatus, centrioles, spindles, cell plate formation, cell synchrony and significance. Amoeboid, flagella and ciliary motility, Spermatogenesis and Oogenesis. **(7 hrs)**
5. **Cell senescence and cell-Recognition & programmed cell death:** Special characteristics of vision cells (Rods and cone), Cell-Cell interaction, cancerous cells, cell-recognition and cell-rejection. **(4 hrs)**
6. **General Introduction of Genetics:** History and scope of genetics, Mendel's Laws of heredity, Mono and di-hybrid crosses, Test-cross, Incomplete dominance and Simple problems. **(5 hrs)**
7. **Interaction of Genes**
 - a. Supplementary factor: Comb pattern in fowls
 - b. Complementary genes: Flower colour in sweet peas.
 - c. Multiple factor: Skin colour in human beings.
 - d. Epistasis: Plumage colour in poultry
 - e. Multiple allelism: Blood groups in human beings **(6hrs)**
8. **Sex Determination in Plants and Animals:** Concept of allosomes and autosomes, XX-XY, XX-XO, ZW-ZZ. ZO-ZZ types Environmental factors affecting sex determination. **Extra Chromosomal Inheritance-**Plastid inheritance in *Mirabilis*, Petite characters in yeast and Kappa particles in paramecium. **(6hrs)**

9. Linkage and crossing over: Coupling and repulsion hypothesis, Linkage in maize and *Drosophila*, Mechanism of crossing over and its importance. Mutations-Spontaneous and induced, physical and chemical mutagens, Induced mutations in plants, animals and microbes for economic benefit. evolutionary significance (8hrs)

10. Chromosomal Variations: Structural and numerical aberrations, Autosomal and allosomal disorders. Chromosomal evolution in wheat and *Drosophila* (5hrs)

PRACTICAL- BT-1.2 CELL BIOLOGY AND GENETICS

1. Study of fixatives and stains: Preparation of formaldehyde (4-10%), Alcohol (70%), Bouin's fixatives, Carnoy's solution, Borax carmine (alcoholic), Eosin (alcoholic), Iron (Haematoxylin). Leishman's Stain, Ringer's Solution, PAS stain, Acetocarmine, Aceto-orcein, Schiff's reagent (Feulgen), Giemsa's stain.
2. Squash preparation of onion root tips to study stages of mitosis.
3. Squash preparation of grasshopper testes and flower buds to study stages of meiosis.
4. Squash preparation to study salivary gland chromosomes (chironomous larvae)
5. Cell counting methods: Hemocytometer and other aids.
6. Micrometry
7. Buccal epithelial smear and Barr body.
8. Mitochondrial staining
9. Extraction of cellular materials in saline buffers, solvents and precipitation.
10. Demonstration of laws of inheritance by using colour beads
 - a. Laws of segregation
 - b. Laws of independent assortment.
 - c. Solve genetic problems
11. Study of different types cells using slides
12. Spotters based on theory paper

REFERENCES:

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2. Knudson A.G. 1998, Anti – Oncogenes and Human cancer. Proceedings of the National academy of sciences USA 90: 10, 0114 – 10921
3. Lodish, H., Ber, A., Zipursky, L.S., Matsudaira, P., Baltimore, D and Darnell J. 2001, Molecular Biology W. H. Freeman & Co 47
4. J. Daniel H and Lodish D 1995, molecular Cell Biology. Baltimore Scientific American Book
5. B. Alberts. D. Bray, J. Lewis, M. Raff K, Roberts and J. D. Watson 1994 Molecular Biology of the Gene. Garland Publisher Inc., New York
6. Gerald Karp 1996, Cell and Molecular Biology. John Wiley and Sons. Inc
7. Elliot and Elliot, 2001 Biochemistry and Molecular Biology. Oxford University Press.
8. Celis J E (Eds): Cell Biology: A Laboratory Hand Book. Vol I & II Academic Press.
9. Pollard J.P. and W.C. Earnshaw 2002. Cell Biology, Saunders
10. EDP Roberties & EMF Roberties, Cell Biology & Molecular Biology –Sauder College
11. Smith and Wood 1992: cell biology Chapman and Hall

12. Tamarin, R.H, (2000): Principles of genetics, 6th Edn. WMC Brown Publication. London.
13. Snustad, P.D, Simmons, M.J 2000: Principles of genetics 2nd Edn. John Wiley and sons, Inc. New York.
14. Fairbanks, D.J and Anderson, W.R 1999: Genetics – continuity of life. Brooks and Cole Publication Company. New York.
15. Lewin, B (2000): GENES VII. Oxford University Press, New York.
16. Strickberger, M.W (2000): Genetics Prentice - Hall of India private limited, New Delhi.
17. Miglani G.S 2000 Basic Genetics Narosa publishing New Delhi.
18. DaniekHartl 2010: Basic Genetics Jones and Barlet publishers USA
19. Klug, W.S, and Cummins: Concepts of genetics 7th edn (2003) Pearson Educations.
20. John Ringo 2004: Fundamental genetics. Cambridge University Press
21. Winter, P.C, Hickey, G.I and Fletchear, H. I (1999): Instant notes in Genetics Viva books private limited, New Delhi.
22. Griffith 2000: an introduction to genetic analysis. 7th edn. W H Freeman. New York.

SEMESTER II
CORE COURSE: BIOTECHNOLOGY
PAPER BT-2.1 BIOMOLECULES AND BIOCHEMICAL TECHNIQUES
(Credits: Theory-4, Practicals-2)
THEORY
TOTAL HOURS ALLOTTED-60

1. **Introduction:** Structure and properties of water, pH, biological buffer system, Henderson Hassel Balch equation. Indicators and Isotopes **(4hrs)**
2. **Carbohydrates:** Classification, Physicochemical properties of important Monosaccharide's. Disaccharides and polysaccharides chemical reactions of carbohydrates. Derivatives of carbohydrates **(8hrs)**
3. **Proteins:** Classification. Structure. Properties of amino acids. Biological functions of proteins. Primary, secondary. Tertiary and quaternary structures. Structural importance of Glycoprotein, Myoglobin, hemoglobin. **(8hrs)**
4. **Lipids:** Classification. Properties and Functions of fatty acids. Important Properties and Functions of Neutral. Glyco, Phospholipids, and Cholesterol. **(6hrs)**
5. **Enzymes:** Classification, Properties, purification of enzymes, factors influencing enzyme-catalyzed reactions, induced fit theory and Lock & Key enzyme machismo, Industrial applications of enzymes. **(6hrs)**
6. **Nucleic acids:** Structure and properties of Nucleoside, Nucleotides, Watson and crick DNA model **(4hrs)**
7. **Vitamins:** Dietary sources and functions of water soluble and fat-soluble vitamins. **(4hrs)**
8. **Hormones:** Chemistry and functions of pituitary and gonadal hormones. **(4hrs)**
9. **Bioenergetics:** Concept of free energy transformations. Redox potentials. Regulation of Glycolysis, Krebs cycle and Electron Transport system. **(6hrs)**
10. **Analytical techniques (Principles & Applications):**
 - a) Microscopy - Compound, phase contrast and electron microscope SEM and TEM.
 - b) Colorimeter and UV- visible spectrophotometer
 - c) Centrifugation (Ultra and Density Gradient)
 - d) Electrophoresis (Agarose and SDS-PAGE)
 - e) Chromatography (Paper, TLC, HPLC). **(10 hrs)**

PRACTICAL BT 2.2–BIOMOLECULES AND BIOCHEMICAL TECHNIQUES

1. Preparation of solutions (percent, Molarity, Molality and Normality). Measurement of pH and Buffers.
2. Qualitative analysis of carbohydrate, amino acids, proteins, and lipids.
3. Paper chromatography of amino acids and sugars.
4. Qualitative analysis of body fluids such as blood and urine.
5. Assay of amylase activity. Effect of pH and temperature
6. Estimation of protein using colorimeter
7. Colorimetric estimation of blood sugar
8. Estimation of total and reducing sugar
9. Osmotic hemolysis in blood cells
10. Estimation of amino acids
11. Estimation of creatinine in urine sample.
12. Testing of acid phosphatase (potato) and alkaline phosphatase (milk) activity.
13. Demonstration of catalase activity.
14. Study of analytical instruments.

References

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2. Strayer. L. (2002) Biochemistry, 5th edn. W. H Freeman and company New York.
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