Controller of Examinations
SAMBALPUR UNIVERSITY
JYOTI VIHAR, BURLA
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FA- 20/3/Acd-I/BOS/ 16-17

URGENT Booth **by Speed Post (To out satiation Institutions) & e-Despatch**

No. 5735(4)/ACD-I (BOS) Date 30/07/16

To

1. ***The Co –ordinator, Private Examinations Cell, Sambalpur University.***
2. ***The Principal, Govt. College, Sundargarh.***
3. ***The Principal, Panchayat College, Bargarh.***
4. ***The Principal, Govt. Women's' College, Sambalpur .***

Sub: Courses of Studies for **P.G.** Courses due to start from the academic session – 2016-17.

Sir,

With reference to the subject cited above, I am to say that Department of Higher Education, Government Odisha in the Letter No. 4910/ HE, dated , 27.02.2016 has directed implementation HE-COOD-PG-0001/2016 of Choice Based Credit System (CBCS)in all the colleges at U.G. and P.G. level . Accordingly the Academic Council was being moved. The Resolution of the Academic Council on the matter in its meeting dated 7.5.2016 the Academic Council resolved as follows :-

> RESOLVED: that this be noted and be adopted in principle in the colleges at undergraduate level under the jurisdiction of the Sambalpur University w.e.f. the academic session 2016-17. Since the spirit of the letter is to implement the CBCS in undergraduate colleges, the Council expresses its view that there is no need of change in syllabus and regulation of courses being run in the P.G.Departments, Jyoti Vihar.

In view of the above the P. G. Regulation under Course Credit Semester System of the University be followed for conduct of P.G. Courses run by your colleges / Cell. The syllabuses of the corresponding P.G. courses run by the P.G. Departments, Sambalpur University, Jyoti Vihar be followed. The syllabuses may be collected from respective P.G. Departments .

P.G. Departments, Sambalpur University, Jyoti Vihar do not offer M.Sc. in **Botany & Zoology and M.Com. courses. So for Syllabuses of the Ist. Semester for** M.Sc. in **Botany & Zoology and M.Com. courses of Revenshaw University be adopted for impart of teaching as per Course Credit Semester System P.G. Regulation .**

This may kindly be made available to the concerned teachers and students of your college/ department/ institution and you are requested to ensure teaching of the courses accordingly. A copy of it may be displayed for information of all concerned.

Any error and omission etc. may kindly be intimated to this office.

This is for your kind information and necessary action.

Yours faithfully

Encl:- Copy of a Regulation for P.G. courses Under Course Credit Semester System Copies of Ist. **Semester for** M.Sc. in **Botany & Zoology and M.Com. courses of Revenshaw University.**

Controller of Examinations

P.T.O.

REGULATION OF GENERAL ACADMEIC MATTERS & COURSE STRUCTURE FOR THE EXAMINATION UNDER COURSE CREDIT SEMESTER SYSTEM IN P.G. DEPARTMENTS OF SAMBALPUR UNIVERSITY, JYOTI VIHAR

(Effective from 1st Semester Examination **2004** for students admitted during 2004-05 to 1st Semester Course)

CHAPTER- 1
Regulation of General Academic Matter

1.1 THE P.G. DEPARTMENTS LOCATED AT JYOTI VIHAR SHALL FOLLOW COURSE CREDIT-CUM-SEMESTER SYSTEM OF TEACHING AND EXAMINATION WITH PERIODIC ASSESSMENT.

1.1.1 **ACADEMIC YEAR.**

The Academic Year of the Course shall ordinarily be from June to May.

1.1.2 **SEMESTER**

The Academic Year shall have **two** Semesters, each of which shall be of **6 months** duration and the courses shall be of **two academic years** covering four semesters.

1.2 **MINIMUM WORKING DAYS IN A SEMESTER:**

A semester shall have a minimum of 90 instructional days. There will be a minimum of 30 hours of teaching per week in a semester, which would cover both credit and non-credit components of the course. Tutorials and any other classes specifically declared shall be as "non-credit components".

1.3 **CREDIT HOURS:**

One credit shall signify the quantum of teaching imparted corresponding to **one hour** of theory class and/or **three hours** Laboratory work per week during a semester in respect of a particular course. The field study, where applicable, should not exceed 30 days (including Sundays) in one semester. Field work shall be credit-based and for one Credit Hour (CH) field work, it shall be maximum of one week duration. Number of classes for every CH Course in theory in each semester shall not be less than 12 classes of one hour duration. **For every theory course, there shall be one tutorial class (1 CH) of one hour** duration per week. However, **courses with practical need not have tutorials.**

One Credit Hour Practical = 3 Hours per week.

One Credit Hour Essay/Dissertation/Project= 1 Hour per week.

NOTE: The Syllabus may be so designed that the total of CH for all four semesters shall be of **80 CH** OR **90 CH** spread equally as far as possible over all semesters.

All Theory papers shall be of 3 or **4 CH and Practical of 2** or **3 CH**

1.4 COURSE

A course is a unit of instruction under any discipline carrying a specific number of credit hours describing its weightage. Those courses that a student must take as compulsory requirement are called **Core Courses**. Those courses, that a student takes out of a list of specialized courses offered by the Department are called, **Elective/Special Courses**. While distributing the teaching hours in a semester, the **theory component shall be of 75 % and practical component of 25 %.** Where there is no practical, the theory component shall be minimum of 80 % that every P.G.Department must have one/or more special/elective paper in 3rd and/ or 4th semester as stipulated in clause 1.4 of the Regulation, because in a P.G. course, Special paper is necessary.

1.4.1 GRADE

C.S. No. 54/2008

The grade awarded to a student in any a particular course shall be based on his/her performance in all the tests conducted during a semester for that course and shall be awarded at the end of the semester. The percentage of marks secured by a student in a particular course shall be converted to a grade and grade point for that course in the manner specified in the following table:

% of marks	Grade	Grade Point (GP)
> = 90	E	10
> = 80 and < 90	A +	9
> = 70 and < 80	A	8
> = 60 and < 70	B+	7
> = 50 and < 60	B	6
> = 40 and < 50	C +	5
> = 30 and < 40	C	4
< = 30	F	0

The Grade Point Average (GPA) shall be calculated as per clause 1.4.2 and shall be awarded at the end of each semester. The Overall Grade Point Average (OGPA) shall be calculated as per clause 1.4.3 and shall be awarded at the end of final semester. In order to pass a course, a candidate has to secure a minimum grade of 'C' (GP = 4) in each theory, practical and other credit components. In order to pass a semester, a candidate must pass each credit course of that semester and must secure a minimum GPA of 4.5. In order to pass a programme, a candidate must pass each semester and must secure a minimum OGPA of 4.5.

1.4.2 GRADE PAOINT AVERAGE (G.P.A)

Grade Point Average (G.P.A) of a Semester shall be calculated as:

$$GPA = \frac{\sum [(\text{Credits in a course}) \times (\text{Grade Point in that course})]}{\text{Total No. of Credits in that Semester.}}$$

Where the summation is taken over all courses in a given semester, G.P.A shall be rounded up to 2 decimal points.

Example: In a semester, a candidate secured the following Grade Points in six Courses.

Course No.	CH	GP	Course No.	CH	GP	Course No.	CH	GP
411	4	8.5	412	4	7.6	413	4	7.8
414	3	6.5	415	3	5.9	416	2	8.5

Total CH. 20 G.P.A = <<(4 x 8.5) + 4 (7.6) + (4 x 7.8) + (3 x 5.9) + (2 x 8.5 / 20 = 7.49.

1.4.3 O.G.P.A (OVERALL GRADE POINT AVERAGE):

It is the average of a accumulated grade points of a student, worked out by dividing the cumulative total of grade points by the cumulative total of credit hours of all the courses covered and completed by a student during all the Semesters.

$$OGPA = \frac{\sum [(\text{GPA of each semester}) \times (\text{Total credits in that Semester})]}{\text{Total No. of Credits in all the Semesters.}}$$

Where the summation is taken over all semester in a given programme, **OGPA shall be rounded up to 2 decimal points**. For merit list, in case of equality, the OGPA shall be calculated beyond two decimal places, if necessary.

Example: A candidate secured the following GPAs in four semesters

Semester	CH	G.P.A
First	20	7.49
Second	24	8.30
Third	22	7.5
Fourth	14	8.8

O.G.P.A. = {(20 x 7.49) + (24 x8.3) + (22 x 7.85) + (14.8.8)}/ 80 = 8.06

1.4.4 CONVERSION OF GRADES TO MARKS AND CLASSIFICATION OF RESULTS UNDER COURSE CREDIT SYSTEM:

THE OGPA can be converted to percentage of marks in the following manner.

Percentage of Marks = (O.G.P.A.- 0.5) x 10

A student after successful completion of all the semesters, Degree shall be awarded in the following manner:

OGPA	6.5 and above	FIRST CLASS
OGPA	5.5 < 6.5	SECOND CLASS
OGPA	4.0 < 5.5	THIRD CLASS
OGPA	< 4.0	FAIL

1.4.5 INTERDISCIPLINARY COURSE:

Each student has to opt one Interdisciplinary Course/ Paper (offered by other then parent Department) in the 3_{rd} Semester of 2 CH over and above the total credit hours to 80-90 CH.

1.5 ACADEMIC CALANDER:

The **Teachers' Council** of the Department shall prepare the schedule of semester registration and other academic activities at the start of the academic session with due consideration of the Academic Calendar of the University.

1.5.4 REQUIREMENT OF AWARD OF DEGREE:

The credit hour requirement for the Master Degree shall be either of **80 (eighty) or 90** (ninety) credits spread equally over all semesters as far as practicable. The residential requirement for Master Degree shall be continuous **four** semesters from the first day of

registration and the **maximum time allowed** to complete the Master's Degree shall be **8 (eight) semesters.**

1.6 REQUREMENT FOR ATTENDANCE:

A candidate shall be required to attend **75 % of lectures**, tutorials and practical classes **separately** during a semester. **Condonation** may be granted by the Teachers' Council only to the extent of **15 % in exceptional cases**. (Illness, accident, mishap in the family, deputation by the University/Deptt.). When a candidate has been deputed by the University to represent the University/State for any activity, the lectures delivered during his/her absence for the purpose shall not be counted towards the calculation of attendance provided, the student submits a certificate to that effect from the appropriate authority.

1.7 COVERAGE OF SYLLABUS:

The **course teacher/instructor** shall be **responsible to the Teacher's Council** for the coverage of the syllabi of the course including fulfillment of the prescribed requirement. The **Head of the Department shall co-ordinate the teaching program**. In case a teacher fails to cover the course within time due to unforeseen circumstances, he shall **take extra classes** to cover the course. The Head of the Department shall get a **course completion certificate** from every **course teacher(s)** at the **end of the semester**.

1.8 ADMISSION NOTICE & ADMISSION POLICY:

The Chairman, P.G.Council shall issue notice of admission into Departments through News Papers. The reservation policy shall be that as decided by the authority of Sambalpur University. The minimum eligibility for admission, maximum number of students to be admitted, and the selection procedure for admission shall be decided by the P.G.Council/University Authority *on recommendation of the Teachers' Council.* In the absence of any specific recommendation by the P.G.Department, the admission policy formulated by P.G.Council and as approved by Vice-Chancellor shall be followed.

1.8.4 ACADEMIC COMMITTEE:

The **Teachers' Council (TC)** of each P.G.Department **shall be the Academic Committee** (the **HOD will act as Convenor**) to monitor the programme. This committee shall review the courses in the Department periodically with a view to ensure quality, relevance and viability of the pedagogic content in an all-India context.

1.9 REGISTRATION IN A SEMESTER:

A student has to register his/ her name at the **beginning of every semester** in the prescribed form, for the course he/she wants to take in that semester. The HOD shall notify the registration dates and the list of registered students for the semester shall be sent to the Controller of Examinations and the Chairman, P.G.Council within two weeks of the commencement of the Semester. A copy of the **list-of registered students** shall remain with **Teacher-in-Charge Examination** of the Department.

2.0 STUDENTS DISCIPLINE:

All matters regarding students' discipline and students' attendance in the Department and hostel shall be same as that of the regulation of Sambalpur University.

CHAPTER- II

REGULATION ON EXAMINATION MATTERS

3.1 EXAMINATION:

Examination system in the P.G.Departments, Sambalpur University shall be based on periodic assessment of a student's performance in two semesters in every year. The system shall be such that, each numbered course shall be taught by a teacher/teachers and the ***questions for the end-term semester examination shall be set by external paper setters*** to be subsequently **moderated by a Board of Moderators recommended by the T.C. for that purpose.** The **list of question setters and examiners shall be forwarded to the Controller of Examinations within four weeks of the commencement of a semester**. This list shall be recommended by the TC. ***At least 50 % of the total Theory examination papers (of all four semesters taken together) shall be evaluated by external examiners*** and the rest by Course teachers. The TC of each Department shall decide the mode of distribution. *Practical examination in each course* of all semesters *shall be conducted by both internal (s) and external examiners*. In case of appointment of more than one internal examiners, the remuneration shall be shared by them equally. The seminar/review/term papers/Field works shall be evaluated by internal examiners only. Project work/Dissertation shall be evaluated both by the external and internal examiners. The ***external examiners shall be appointed from outside Sambalpur University***.

3.2 MODERATION BOARD:

For each academic session, the **T.C shall recommend the formation of a Moderation Board**, consisting of **three members** for moderating question papers. **One member shall be from among the departmental faculty** members where as the other members shall be from outside Sambalpur University. The **list of members shall be forwarded to the Controller of Examinations for approval of the Vice-Chancellor.** At least **two** members shall constitute the **quorum** for the board meeting. The University shall pay TA/DA to the members of the Board as admissible, for attending the Moderation Board Meeting. Each member shall get remuneration as per rule. The Moderation Board shall ensure that question have been set covering the whole course **unit-wise** in a particular paper. The Moderation Board can modify the question, if it so desires.

3.3 TEACHER-IN-CHARGE OF EXAMINATION:

To assist the Head, the T.C shall appoint a teacher of the Department as Teacher-in-Charge of Examination for **two academic sessions**. He/She shall be responsible for maintaining all the norms and confidentiality of examination. He/She shall **prepare** the **draft schedule** of semester examination of the Department in consultation with the Controller of Examinations and incorporate it in the Academic Calendar when it is finalized by the Teachers' Council. The Teacher-in-Charge of Examination shall act as a bridge between the Department and the examination wing of the University, ensuring monitoring and smooth conduct of the semester examinations. The Head of the Department shall make alternative arrangement, if the Teacher-in-Charge of Examination remains absent.

3.4 PERIODICAL TESTS FOR CONTINUOUS EVALUTION:

In each semester there shall be **two periodical evaluations**, **one** through **written periodical test (60 minutes duration)** and/or the other a **home assignment/seminar** writer for each paper conducted by the Teacher (s) concerned. Both shall carry a **weightage of 10 %** each in the total marks/grade of the course. The periodical test shall be conducted during the **class hours** of the respective course teachers in a particular day. However, other classes shall not be suspended on that day. The **marks/grades** of the periodical and home assignment/seminar shall be submitted in **triplicate** to the Teacher-in-Charge of examination **within five days** of the test. The Teacher-in-Charge of examination shall **forward** these **marks/grades** in **duplicate** to the Controller of Examinations at least one week ahead of the end-term semester examination. The dates of periodical examination and of submission of **home assignment**/conducting **seminar** shall be **decided by the T.C** and the course teacher shall be responsible for the conduct of periodical examination and giving home assignment/conducting seminar in time. **A student, if so desires, may be allowed to see his/her periodical answer scripts** only. A **periodical test cannot be improved or repeated**.

3.5 SEMESTER EXAMINATION:

C.S. No. 59/2009 After the end of each semester there shall be an examination of each theory course of 3 hours duration and of each practical course of 4 hours duration, which shall be called

"Semester Examination". The classes shall remain suspended ten days (including, Sundays and holidays, if any) before the date of commencement of semester Examination for preparation by the students. The total marks in a course unit shall be 100 only of which 20 marks shall be of periodical test **(10 marks for written periodical test** and the other **10 marks for home assignment/seminar)** and the rest 80 marks shall be for Semester Examination.

3.6 CENTRE SUPERINTENDENT:

The **Head** of the Department or his nominee shall be the **Ex-officio Centre Superintendent** of all semester examinations of the Department. The Controller of Examinations with the **approval of the Vice-Chancellor shall appoint an Observer outside the Department for each theory** paper examination who shall be present in the examination room **at least for one hour** and shall give a report on the conduct of the examination in the proforma given by the University. The Observer shall get remuneration as per University rules. Ordinarily, **the answer scripts shall be sent to the Controller of Examinations on the same day**.

3.7. EVALUATION OF ANSWER SCRPTS:

The **Teacher-in-Charge of Examination** shall **furnish a course wise list of examiners** to the **Controller of Examinations** before the commencement of each Semester Examination. The list of Examiners shall be prepared and recommended by the **Teachers' Council** and shall be forwarded to the Controller of Examinations for approval of the Vice-Chancellor.

3.8 CONDUCTING BOARD

Two senior most Teachers & the Head shall be the members of the Conducting Board. Controller of Examinations shall convene the meeting of the Board as and when required.

3.9 RESULT OF EXAMINATIONS:

After passing of the result by the Conducting Board, the Controller of Examinations shall submit two copies of list of successful candidates **along with their grades** for approval of the Vice-Chancellor in each semester. A Semester Cell shall be created under one Assistant Controller of Examinations to publish the result, and issue of Grade Sheet and Provisional Certificate and Grade Sheet at the end of 4th Semester Examination. **The results shall be declared ordinarily within four weeks of completion of the Examinations. The candidate shall have to appear in all the units of a semester**

examination to be eligible to be declared pass provided, he/she secures minimum pass grade. **The result of 4th semester examination of a student shall not be published unless he/she has passed in the three previous semester examinations.**

4.0 PROMOTION TO THE NEXT SEMESTER:

A student shall be admitted to the next higher semester only when he/she has appeared in all the courses of the previous semester examination. However, a student failing to appear semester examination in some or all papers due to some reasons as mentioned in point 4.1 below may be admitted to the next semester. Such student shall produce sufficient proof in favour of his/her reason for not being able to appear in some or all papers of the Semester Examination. Such cases **shall be considered by the TC** of the Department for giving permission for admission into next semester. Such students **shall appear the repeat Semester Examination of the next academic session** provided that, **no student shall be allowed to appear the fourth semester if he/she has not passed the First Semester Examination.**

4.1 ABSENCE FROM EXAMINATION:

If a student is unable to appear a semester examination in some or all papers, the **TC of the Department shall consider his/her case** for admission into the next higher semester only in following cases:

a. When he/she is hospitalized;

b. When he/she is not able to appear in the examination due to serious illness or death of parents, brothers, sisters, spouse or children;

c. When he/she met an accident of serious nature;

d. When the Department/University or any official directive deputes him.

4.2 PROCEDURE FOR REPEAT/IMPROVEMENT:

4.3 REPEAT:

A student shall repeat all the theory and practical papers in which he/she has failed in the semester-examination **within a period of 8 semesters from the date of first registration**. [However, students passing in all papers in terms of grade point but failing in grade point average then have to appear repeat examination in those papers in which they have secured less than the required average grade point to pass]. Such students shall

commencement of examination. The invigilators shall keep a **record of temporary absence** of students from the examination hall/room during the examination.

6.2 ADOPTION OF UNFAIR MEANS IN THE EXAMINATION:

Possession of unauthorized materials and using it, copying from scripts of other students or from any other source, sharing his/her answer script with other during an examination, creating disturbance or acting in a manner so as to cause inconvenience to other students in the examination hall or near about shall be treated as adoption of unfair means or malpractice.

6.3 DISCIPLINARY ACTION FOR ADOPTION OF UNFAIR MEANS IN THE EXAMINATION:

In case of adoption of unfair means by an examinee in the examination hall, the invigilator shall immediately report to the Centre Superintendent in writing along with the incriminating material (if any) collected from the examinee signed by both the concerned examinee and the invigilator. The Centre Superintendent shall refer it to the Controller of Examinations for necessary disciplinary action as per the rules and regulations of the University.

7.0 EXAMINATION FEES:

The Examination fees shall be collected by the University before each Semester Examination at a rate prescribed by the University from time to time.

PAPER 1.1.1: MICROBIOLOGY

50 Marks (3 hours) (40 marks end semester and 10 marks mid semester examination)

UNIT –I

History and development of microbiology, General features of Bergy's manual for classification of microbes, Whittakar's five kingdom concept, Carl Woese's 3 domain classification, Isolation, culture and maintenance of microorganisms, Microbial growth, continuous culture (chemostat), Factors influencing growth of microbes, Role of microbes in agriculture and industry.

UNIT -II

General features of Archaea, Structure, Nutrition and Reproduction of Eubacteria, Genetic recombination in bacteria (Transformation, Conjugation and Transduction), General features and pathogenecity of mycoplasma, Rickttsia and Spirochaetes.

Cyanobacteria: Cell structure and reproduction. Heterocysts: Structure, development and function

UNIT-III

Virus: General characteristics and classification of viruses, nature , morphology and chemistry of virus, transmission of virus, virus-vector relationship, replication of Bacteriophage

Plant virus- TMV, structure, transmission, pathogenicity and replication

Animal viruses - HIV, structure, transmission, pathogenicity and replication

Treatment and prevention by anti-virals and vaccine

Viroids and Prions.

UNIT –IV

Microbial toxins: types, mode of actions and pathogenicity.

Bacterial toxins: Endo and exotoxins

Fungal toxins: toxins of *Aspergillus, Penicillium, Fusarium* and *Alternaria*

Algal toxins: cyanotoxins and dinotoxins

Chemotherapeutic agents: antibiotics and their mode of action; bacterial drugs (Penicillin, fluoroquinolones, tetracycline and aminoglycosides)

M.Sc. Botony Syllabus.

***PAPER 1.1.2*: Genetics**

50 Marks (3 hours) (40 marks end semester and 10 marks mid semester examination)

UNIT-I

Mendel's experiments and laws of inheritance, gene interaction with epistasis or modified mendelian dihybrid ratios: masking gene action, supplementary gene action, duplicate gene action, complementary gene action

Multiple allele in human (ABO blood group); eye colour in Drosophila, self incompatibility in plants; Polygenic inheritance, pleiotrophy

Maternal effects and cytoplasmic inheritance, mitochondrial & chloroplast genome

UNIT-II

Sex chromosomes, Chromosomal sex determination: XX-XY, XX-XO and ZZ-ZW systems, Compound sex chromosome,

Meiotic behavior of chromosomes: Primary & Secondary non-disjunction, Genic balance theory of sex determination, Sex determination in humans and Drosophila with special reference to SRY and sex lethal genes.

Sex linkage: Sex linked genes in man, sex chromosome disorders in man, Sex influenced dominance by sex-linked gene expression.

Sex determination in plants with special reference to *Melandrium*

UNIT-III

Linkage groups: Complete and incomplete linkage

Crossing over: Relationship between genetic and cytological crossing over, Relationship between crossing over and chaisma formation, molecular mechanism of crossing over

Detection of linkage & Linkage maps: Test cross, test for linkage on the basis of F_2 generation, LOD score, gene mapping, three point test cross in Drosophila, construction of linkage maps, identification of particular linkage groups with specific chromosome, physical distance and map distance

Interference and coincidence

Mitotic Recombination, Recombination within gene

Unit-IV

Structural and numerical alterations in chromosomes: Spontaneous and induced mutations, physical and chemical mutagens, chromosomal aberrations, meiotic behavior of deletion, duplication, inversion and translocation.

Euploids and aneuploids-classification, origin, induction, role of polyploidy in evolution and practical significance in crop improvement

Population genetics: Hardy-Weinberg's Law, genetics of quantitative traits in population

PAPER 1.1.3: **Biochemistry**

50 Marks (3 hours) (40 marks end semester and 10 marks mid semester examination)

UNIT-I

Amino acids: Classification and properties, Acid–base properties, The Peptide bond, ionization behavior of peptides, biologically active peptides.

Levels of protein structure, Determination of primary structure of protein. Three dimensional structure of proteins (Secondary, tertiary and quaternary structures, structural patterns: motifs and domains), Protein denaturation and folding

Amino acid catabolism (transamination, oxidative deamination and urea cycle)

Protein degradation (proteosomal pathway) and Solid phase synthesis of peptides.

UNIT - II

Carbohydrates: Classification, configuration and conformation of monosaccharides, sugar derivatives, important disaccharides. Structural and storage polysaccharides, glucosaminoglycans, proteoglycans, glycoproteins and glycolipids

Carbohydrate metabolism: Glycolysis, TCA cycle, pentose-phosphate pathway. Gluconeogenesis, glycogen metabolism, regulation of carbohydrate metabolism, Oxidative phosphorylation, electron transport and ATP synthesis

UNIT –III

Enzymes: General properties, nomenclature and classification, extraction and assay

Michaelis-Menten kinetics and its significance, Brigg's-Halden modification, determination of V_{max} and K_m

Mechanism of enzyme action: general acid-base catalysis, covalent catalysis, metal catalysis

Mechanism of action of RNAse, Lysozyme and Chymotrypsin

Enzyme inhibition: competitive, non-competitive inhibition, determination of K_i, allosteric regulation, covalent modification

UNIT – IV

Lipids: Classification, storage lipids, structural lipids (glycerophospholipid and sphingolipids), signaling lipids, cofactors, terpenes, and pigments.

Coenzymes and vitamins

Biosynthesis and oxidation of fatty acids, regulation of fatty acid metabolism

PAPER 1.1.4: **Plant Physiology**

50 Marks (3 hours) (40 marks end semester and 10 marks mid semester examination)

UNIT-I

Water balance in plants, water absorption and transport through xylem, active and passive transport
Transport of ions across membrane barrier, membrane transport processes,
Membrane transport proteins: water channels, H^+ - ATPase and H^+- pyrophosphatase
Mechanism of solute accumulation in vacuoles, solute transport: Phloem loading & unloading

UNIT-II

Photochemistry and photosynthesis: General concept of photochemistry, Photosynthetic pigments and light harvesting complexes, Photo-oxidation of water, mechanisms of electron and proton transport & ATP synthesis.
Carbon assimilation: C_3, C_4 cycle and the CAM pathway
Photorespiration and its significance, the glyoxylate cycle
Biosynthesis of starch and sucrose

Unit-III

Nitrogen metabolism: Overview, biological nitrogen fixation, mechanism of nitrate uptake and reduction, nitrate and ammonium assimilation, amino acid biosynthesis.
Stress Physiology: Responses of plants to biotic and abiotic stresses, mechanism of stress resistance and tolerance, water deficit and drought stress, salinity stress, metal toxicity, freezing and heat stress, HR and SAR, oxidative stress.

UNIT-IV

Plant growth regulators: Physiological effects and mechanism of action of auxins, gibberellins, cytokinins, ethylene and abscisic acid
Photoreceptors: phytochromes, cytochromes, UV-B and their role in regulation of plant morphogenesis
Flowering: Phenomenon of flowering, photoperiodism and its significance, endogenous clock

PAPER 1.1.5: PRACTICALS

100 marks (6 hours) (80 marks end semester and 20 marks mid semester examination)

1. General idea on instruments used in microbiology laboratory.
2. Preparation and sterilization of media (Nutrient Agar, Nutrient Broth, Czapeck-Dox), Plating, Tubing, Slanting of media.
3. Gram staining and acid-fast staining of bacteria.
4. Isolation of bacteria in pure culture.
5. Study of commonly occurring cyanobacteria.
6. Measurement of length/breadth/diameter of microbial cell/spore using ocular and stage micrometer.
7. Study of principles of spectrophotometer and verification of Beer-Lambert's law.
8. Effect of substrate concentration on activity of any enzyme and determination of Km value. (Acid Phosphatase, peroxidase, catalase)
9. Extraction of pigment from leaves and preparation of absorption spectra for chlorophylls and carotenoids.
10. Preparation of standard curves for quantification of protein, carbohydrate and reducing sugar.
11. Quantification of soluble and total protein and total carbohydrate contents of plant samples.
12. Isolation of Chloroplast and study of protein profile of RUBISCO by SDS-PAGE.

PAPER 1.1.1: MICROBIOLOGY

50 Marks (3 hours) (40 marks end semester and 10 marks mid semester examination)

UNIT –I

History and development of microbiology, General features of Bergy's manual for classification of microbes, Whittakar's five kingdom concept, Carl Woese's 3 domain classification, Isolation, culture and maintenance of microorganisms, Microbial growth, continuous culture (chemostat), Factors influencing growth of microbes, Role of microbes in agriculture and industry.

UNIT -II

General features of Archaea, Structure, Nutrition and Reproduction of Eubacteria, Genetic recombination in bacteria (Transformation, Conjugation and Transduction), General features and pathogenecity of mycoplasma, Rickttsia and Spirochaetes.

Cyanobacteria: Cell structure and reproduction. Heterocysts: Structure, development and function

UNIT-III

Virus: General characteristics and classification of viruses, nature , morphology and chemistry of virus, transmission of virus, virus-vector relationship, replication of Bacteriophage

Plant virus- TMV, structure, transmission, pathogenicity and replication

Animal viruses - HIV, structure, transmission, pathogenicity and replication

Treatment and prevention by anti-virals and vaccine

Viroids and Prions.

UNIT –IV

Microbial toxins: types, mode of actions and pathogenicity. Bacterial toxins: Endo and exotoxins

Fungal toxins: toxins of Aspergillus, Penicillium, Fusarium and Alternaria

Algal toxins: cyanotoxins and dinotoxins

Chemotherapeutic agents: antibiotics and their mode of action; bacterial drugs (Penicillin, fluoroquinolones, tetracycline and aminoglycosides)

PAPER 1.1.2: Genetics

50 Marks (3 hours) (40 marks end semester and 10 marks mid semester examination)

UNIT-I

Mendel's experiments and laws of inheritance, gene interaction with epistasis or modified mendelian dihybrid ratios: masking gene action, supplementary gene action, duplicate gene action, complementary gene action

Multiple allele in human (ABO blood group); eye colour in Drosophila, self incompatibility in plants;

Polygenic inheritance, pleiotrophy

Maternal effects and cytoplasmic inheritance, mitochondrial & chloroplast genome

UNIT-II

Sex chromosomes, Chromosomal sex determination: XX-XY, XX-XO and ZZ-ZW systems, Compound sex chromosome,

Meiotic behavior of chromosomes: Primary & Secondary non-disjunction, Genic balance theory of sex determination, Sex determination in humans and Drosophila with special reference to SRY and sex lethal genes.

Sex linkage: Sex linked genes in man, sex chromosome disorders in man, Sex influenced dominance by sex-linked gene expression.

Sex determination in plants with special reference to Melandrium

UNIT-III

Linkage groups: Complete and incomplete linkage

Crossing over: Relationship between genetic and cytological crossing over, Relationship between crossing over and chaisma formation, molecular mechanism of crossing over

Detection of linkage & Linkage maps: Test cross, test for linkage on the basis of F_2 generation, LOD score, gene mapping, three point test cross in Drosophila, construction of linkage maps, identification of particular linkage groups with specific chromosome, physical distance and map distance

Interference and coincidence

Mitotic Recombination, Recombination within gene

UNIT-IV

Structural and numerical alterations in chromosomes: Spontaneous and induced mutations, physical and chemical mutagens, chromosomal aberrations, meiotic behavior of deletion, duplication, inversion and translocation.

Euploids and aneuploids-classification, origin, induction, role of polyploidy in evolution and practical significance in crop improvement

Population genetics: Hardy-Weinberg's Law, genetics of quantitative traits in population

PAPER 1.1.3: Biochemistry

50 Marks (3 hours) (40 marks end semester and 10 marks mid semester examination)

UNIT-I

Amino acids: Classification and properties, Acid–base properties, The Peptide bond, ionization behavior of peptides, biologically active peptides.

Levels of protein structure, Determination of primary structure of protein. Three dimensional structure of proteins (Secondary, tertiary and quaternary structures, structural patterns: motifs and domains), Protein denaturation and folding

Amino acid catabolism (transamination, oxidative deamination and urea cycle)
Protein degradation (proteosomal pathway) and Solid phase synthesis of peptides.

UNIT - II

Carbohydrates: Classification, configuration and conformation of monosaccharides, sugar derivatives, important disaccharides. Structural and storage polysaccharides, glucosaminoglycans, proteoglycans, glycoproteins and glycolipids

Carbohydrate metabolism: Glycolysis, TCA cycle, pentose-phosphate pathway. Gluconeogenesis, glycogen metabolism, regulation of carbohydrate metabolism, Oxidative phosphorylation, electron transport and ATP synthesis

UNIT –III

Enzymes: General properties, nomenclature and classification, extraction and assay Michaelis-Menten kinetics and its significance, Brigg's-Halden modification, determination of V_{max} and K_m

Mechanism of enzyme action: general acid-base catalysis, covalent catalysis, metal catalysis
Mechanism of action of RNAse, Lysozyme and Chymotrypsin

Enzyme inhibition: competitive, non-competitive inhibition, determination of K_i, allosteric regulation, covalent modification

UNIT – IV

Lipids: Classification, storage lipids, structural lipids (glycerophospholipid and sphingolipids), signaling lipids, cofactors, terpenes, and pigments.

Coenzymes and vitamins

Biosynthesis and oxidation of fatty acids, regulation of fatty acid metabolism

Paper ZO – 1.1.4
50 Marks (3 hours) (40 marks end semester and 10 marks mid semester examination)

ANIMAL DIVERSITY (NON -CHORDATES & CHORDATES) & ANIMAL BEHAVIOUR

UNIT-I (Animal diversity-I: Non-chordates)

Nutrition in protozoa - Types and mode of feeding, Protozoan parasites in brief (*Trypanosoma, Plasmodium*), Canal system in Sponges, Coral reef formation and significance, Polymorphism in Coelenterates, Excretory structures and functions in Annelids, Helminth parasites (*Taenia, Ancylostoma*), Vision In insects

UNIT-II (Animal diversity-II: Non-chordates & Protochordates)

Torsion in Gastropoda, Nervous system in Cephalopods, Water vascular system in Echinoderms, Reproduction and development in Echinoderms with evolutionary significance, General characters & interrelationship of Proto-chordates and Siphon mechanism in Tunicates

UNIT-III (Animal diversity-III: Chordates)

General characters of Cyclostomes , Accessory respiratory organs in fishes , Origin of Amphibia, Adaptive radiation in reptiles, Classification of reptiles based on skull pattern, Flight adaptation in Birds General characters of Prototheria and Metatheria, Adaptive radiation in mammals

UNIT-IV (Animal behavior)

Classification & analysis of behavior patterns, Tools and Techniques in behavioural study, Neural & hormonal control of behavior , Communication in animals, Social organization of insects and mammals, Biological rhythms: Circadian , Parental care, Orientation & navigation: Migration of fish and bird

Reference Books

1. Invertebrate structure by Barrington & Nelson
2. Invertebrates by Pough
3. The invertebrates Vol I to VI by LH hyman
4. Protozoology by R Kudo
5. A text book of zoology (vol-I & II) by TJ Parker & WA Haswell
6. Phylum chordata by H Newman
7. The life of vertebrates by JZ Young
8. Biology of Animals. By Ganguly, BB., Sinha, A.K., Adhikari, S., New Central Book Agency, Kolkata
9. Invertebrate Zoology. By Barnes
10. The Invertebrates: Function and Form. By Sherman W and and Sherman VG
11. Animal Behavior by J Alcock
12. Principles of animal communications by JW Bradbury

M.Com. Syllabus

P.G. DEPARTMENT OF COMMERCE

SCHOOL OF COMMERCE AND MANAGEMENT STUDIES
RAVENSHAW UNIVERSITY, CUTTACK

Ist SEMESTER

MASTER OF COMMERCE

SIX compulsory papers of 50 marks each = 300 marks	
MCO 1.1.1	ACCOUNTING FOR MANAGERIAL DECISIONS
MCO 1.1.2	ADVANCED MARKETING MANAGEMENT
MCO 1.1.3	ADVANCED MANAGEMENT ACCOUNTING
MCO 1.1.4	ECONOMICS FOR MANAGERS
MCO 1.1.5	EMERGING BUSINESS LAWS
MCO 1.1.6	COMPUTER APPLICATION IN BUSINESS

MCO 1.1.1.

ACCOUNTING FOR MANAGERIAL DECISIONS

FM-10+40 **Time- 3 hours**

UNIT-I **BUDGETING AND RESPONSIBILITY ACCOUNTING**

Budgeting: Definition, Essentials of budgeting, types of budgets- functional, fixed and flexible, cash budget, etc. Budgetary control, zero base budgeting and performance budgeting, Responsibility Accounting: Cost center, Revenue Center, Profit Center, Investment Center and measuring divisional performance.

UNIT-II **COST MANAGEMENT AND STANDARD COSTING**

Cost Management: Cost control drivers, Total Cost Management, Business Process, Re-engineering, TCM vs. TQM. Standard costing and variance analysis, Standard costing as a control technique, setting of standards and their revision, variance analysis- meaning and importance, kinds of variance and their uses- overhead and sales variances, Disposition of variances, relevance of variances and investigation of variances.

UNIT-III **MIS, HRA AND ACCOUNTING FOR PRICE LEVEL CHANGES**

Management Information System: Definition, Concept, Requirements, Steps, Management reporting system, Management control system, transfer pricing and multinational consideration, Human Resources Accounting: Nature, Objective, Advantages, Measurement and Models of HRA, Accounting for price level changes: Introduction, objectives and methods.

Reference:

1. Prof. Jawaharlal, Accounting for Management, Himalaya
2. T.P. Ghose, Accounting and Finance for Managers, Taxman
3. I.M. Pandey, Management Accounting, Vikas Publishing
4. Gupta, Financial Accounting for Management, Pearson Education
5. Jelsy Joshph Kuppapally, Accounting for managers, Prentice Hall of India
6. Sharma, Vital, Financial Accounting for Management- Macmillan
7. Horngren, Dater & Foster: Cost Accounting- A Managerial Emphasis, PHI

ADDVANCED MARKETING MANAGEMENT
MCO-1.1.2

FM-10+40 **Time- 3 hour**

UNIT-I **Marketing Framework:**

Concept, Scope and Importance of Marketing, Different Marketing, Concepts, Marketing Mix, Marketing Environment- Macro and Micro Components and their Impact on Marketing Decisions, Marketing Segmentation, Concept, types and importance, Buyer Behavior- Concept, Types , Motives and Decision Making Process.

UNIT-II **Product and Pricing decisions Distribution Promotion Decisions:**

Concept and classification of Products: product Line and Product Mix, Branding, Packaging and Labeling, Product Life Cycle; New product Planning and Development; Factors Affecting Price Determination; Pricing Policies and Strategies. Concept and Functions of channel members, Channel Design decisions, Channel Management, Retailing and Wholesaling; Logistics Management

UNIT-III **Marketing Research and Services Marketing:**

Communication Process; Promotion Mix-Advertising, Personal Selling, Sales Promotion, Publicity, Public Relations; Concept and Scope of Marketing Research; Marketing Research Process; Services Marketing; International Marketing; Industrial Marketing; Ethical and Legal Aspects of Marketing

References:

1. Kotler, Philip and Gary Armstrong: Principles of Marketing, Prentice Hall, New Delhi.
2. Sherlekr, Pany – Marketing Principles and Management-Himalaya.
3. Stanton, William J., and Charles Futrell : Fundamentals of Marketing : McGraw Hill
4. Majumdar, Ramanuj : Product Management in India, Prentice Hall, New Delhi.
5. Ramaswamy, V.S. and Namakumari, S: Marketing Management, Macmillan India
6. Srinivasan, R: Case Studies in Marketing: The Indian Context, PHI

MCO 1.1.3
ADVANCED MANAGEMENT ACCOUNTING

FM-10+40 **Time- 3 hours**

UNIT-I **ADVANCED MARGINAL COSTING AND ALTERNATIVE CHOICES**

Marginal costing, break even analysis and cost volume profit analysis: concepts, assumptions, practical applications, advantages and limitations. Alternative choice decisions: types of choice decisions, make or buy, add or drop products, sell or process further, operate or shut down, special orders, replace or retain, product mix, fixation of selling price, discontinuation of product line, etc. Differential cost analysis: concepts, practical applications, advantages and limitations.

UNIT- II PRICING DECISIONS AND TRANSFER PRICING

Pricing Decisions: Factors affecting pricing decisions, methods of pricing, short run vs. long-run pricing decisions, target pricing, life cycle product costing and pricing, economic approach of pricing, price indifference point. Transfer pricing: Concept, objectives in sound transfer pricing system, requisites of sound transfer pricing system and methods of transfer pricing, limitations, guidelines and transfer pricing in multinational companies.

UNIT-III STRATEGIC MANAGEMENT ACCOUNTING

Meaning, techniques: Balanced Score Card: Concepts, Meaning, Perspective and characteristics of good Balance Score Card. Target Costing: Concepts and Meaning. Kaizen costing: Concepts and Meaning, kaizen vs. target Costing.

Reference:

1. Horn green, Dater & Foster: Cost Accounting – A managerial Emphasis, PHI
2. J. Madegowda, Advanced Management Accounting - Himalaya
3. T.P Ghosh, Accounting and Finance for Managers, Taxman Publications;
4. I.M. Pandey, Management Accounting, Vikas Publication
5. Gupta , Financial Accounting for Management, Pearson Education,
6. Jelsy Joseph Kuppapally, Accounting for managers, Prentice Hall of India.
7. Subash Sharma, M. Panduranga Vithal, Financial Accounting for Management, Macmillan Publishers India, Ltd.
8. Dr. Jawaharlal, Advance Management Accounting, S. Chand
9. R. M. Kishore-Advance Management Accounting, taxman, New Delhi.

MCO. 1.1.4
ECONOMICS FOR MANAGERS

FM-10+40 **Time- 3 hours**

UNIT-I **Nature and Scope of Managerial Economics:**

Objective of a firm; Economics theory and managerial theory; Managerial economist's role and responsibilities; the nature and objectives of the firm, maximizing verses satisfying constrained decision making. The concept of economic profit. Measurement and policies on profit maximization. Managerial Economics and decision making. Use of stochastic models in decision making.

UNIT-II **Demand Analysis**:

Indifference Curve Analysis: Approach, MRS, Properties, Managerial Applications and its superiority. Demand Analysis: Law of demand, determinants of demand, Elasticity of demand- its meaning and importance, price elasticity, Income elasticity and cross elasticity. Using elasticity in managerial decision. Demand Functions Demand estimation for major consumer and durable goods, Demand forecasting technique. Production Theory: Production function- production function with one and two variable inputs, Cobb- Douglas production function, Estimation of production function, Cost theory and estimation; Economic value analysis, Short and long run cost functions- their nature, shape and inter-relationship; Estimation of a short-run cost function.

UNIT-III **Price Determination under different market conditions**:
Characteristics of different market structures, Price and output decisions under perfect competition, monopolistic competition, oligopoly and monopoly. **Pricing practices**: Methods of price determination in practice, Pricing of multiple products, Price discrimination, International price discrimination and dumping, Transfer pricing.

References

1. A. Mas Colell, M.D. Whinsgton, J.R. Green, Micro-Economic Theory, Oxford
2. Mithani DM-Managerial Economics-Himalaya, 2011.
3. H.R. Varian, Microeconomic Analysis, W.W. Norton, 1984, 2nd ed.
4. A. Koutsoyiannias, Modern Microeconomics, ELBS 1975.
5. Chopra, O.P : Managerial Economics, Tata McGraw Hill, Delhi
6. Dean Joel: Managerial Economics, Prentice Hall, Delhi
7. Dholakia R.H., and A.L. Oza: Micro Economics for Management students, Oxford University Press
8. Eaton, B. Curtis and Diane Faton: Micro Economics, PH Delhi

MCO. 1.1.5
EMERGING BUSINESS LAWS

FM-10+40 **Time- 3 hours**

Unit- I

SEBI Act, 1992;
Consumer Protection Act, 1986
Competition Act , 2002

Unit - II

Environment Protection Act , 1986
FEMA Act, 1999
Prevention of Money Laundering Act, 2002

Unit - III

Information Technology Act, 2000,
Right to Information Act ,2005
Women and Human Right at Work place

Reference :

1. Bulchandani KR – Buisness Laws – Himalaya Publishing House
2. N. D. Kapoor- Mercantile Law- Sultan Chand & Sons.
3. Maheswari, Maheswari – A Manual of Business Law - Himalaya
4. Corporate Laws, Dr. S..K.Kapoor, Taxman Publication
5. SEBI Act- 1992
6. FEMA ACT 1999
7. MRTP ACT 1669
8. Consumer Protection Act – 1986

MCO. 1.1.6
COMPUTER APPLICATION IN BUSINESS

FM-10+40 **Time- 3 hours**

UNIT-I: **Computer Networks and Internet**

Meaning and Components; Basic Idea of Different Types of Networks; Internet-a Global Network; E-Mail; Common Protocol Used in Internet; Concept of World Wide Web and Internet Browsing; Internet Security; Application of Internet in Business. Basic idea of DOS, WINDOWS, Introduction and working with MS-Word in MS-Office , MS-Excel, MS-Power Point- Basic Commands, Formatting Texts and Documents, working with Graphics and Creating Presentation the Easy Way. Introduction to Cyber Crime

UNIT-II: **Introduction to E-commerce:**

Meaning and Concept, Objectives, Advantages and Disadvantages, E-Commerce and E-Business, Traditional Commerce vs. E-Commerce, Forces Driving E-Commerce, Growth of E-Commerce, E-Commerce Opportunities for Industries, Future of E-Commerce. Forms of E-Commerce- Business to Consumer, Business to Business, Business to Government, Other Models-Brokerage Model, Aggregator Model, Info- mediary model, Community Model and Value Chain Model, Transaction Process. Websites Generation-Concept and Meaning ,Objectives and Advantages, Types of Websites, Website Designing Principles, Methods of Promoting Website , Searching the Website , Factors for Growth of Websites .

NIT-III: **Introduction to Accounting Packages and DBMS**

Maintaining of Ledgers, Preparation of Vouchers and Invoice; Pay Slip Generation through pay roll, Maintenance of Inventory Records, Accounting Books and Final Accounts; Financial Reports Generation as per revised schedule –VI Traditional File Management; Processing Techniques; Limitation of File Management Systems; Meaning and Features of DBMS; Components of DBMS; Architecture of DBMS; Functioning of DBMS. Enterprise Resource Planning

References:

1. Date, C.J.: An Introduction to Database Systems, Addison Wesley, Massachusetts.
2. Sudalaimuthu – Computer Application in Business - Himalaya
3. Dienes, Sheila S : Microsoft office, Professional for Windows 95 ; Instant Reference ; BPB Publication, Delhi.
4. Mansfield, Ron: The Compact Guide to Microsoft office; BPB Publication, Delhi.
5. Norton, Peter: Working with IBM-PC, BPB Publication, Delhi.
6. O'Brian, J. A.: Management Information Systems, Tata McGraw Hill, New Delhi.
7. Ullman, J.O.: Principles of Database Systems, Galgotia Publications, New Delhi.
8. Korth, Data Based Management System
9. Silvershatiz, Galvin, Operating System Concepts.

MCO. 1.1.6
COMPUTER APPLICATION IN BUSINESS

FM-10+40 **Time- 3 hours**

UNIT-I: **Computer Networks and Internet**

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