

# **SOLAPUR UNIVERSITY, SOLAPUR**

## **Semester Pattern Syllabus**

### **B.Sc. II**

### **STATISTICS**

**(w.e.f. June 2011)**

B.Sc. II (Statistics) (Honors) Semester wise pattern to be introduced from June 2011. This syllabus of statistics carries 300 marks. In semester –III , University Examination of theory paper –V & VI and in semester – IV , University Examination of theory paper –VII&VIII. The University examination of practical paper –II and paper –III will be held annually. The distribution of marks is as below.

#### **Semester –III**

Paper V : Continuous probability Distributions -I (50 Marks)

Paper VI: Discrete Probability distribution and statistical methods (50 Marks)

#### **Semester- IV**

Paper VII: Continuous Probability Distributions II (50 Marks)

Paper VIII: Applied Statistics (50 Marks)

3. Practical Paper –II (50 Marks) and paper –III (50 Marks) annually. (100 Marks)

Note (1) Total teaching periods for two theory papers in each semester are six per week.

(2) Teaching periods for practical paper-II and paper-III are four periods per paper week per batch of 16 students.

Duration of University Examinations:

- 1) For each theory paper ,duration is of two hours.
- 2) For practical paper-II , four hours for a batch of 16 students annually.
- 3) For Practical paper-III , four hours for a batch of 16 students annually.

**SOLAPUR UNIVERSITY, SOLAPUR**

**Semester Pattern Syllabus**

**B.Sc.Part-II**

**STATISTICS**

**(w.e.f. June 2011)**

**Objectives :**

The main objective of this course is to introduce semester system to the students which covers the basic concepts of continuous univariate, bivariate distributions, sampling theory. Study of some standard discrete and continuous distributions, exact sampling distribution, correlation and regression analysis, test of significance and applied statistics.

By the end of course, students are expected to:

- i. Distinguish between discrete and continuous probability distributions.
- ii. Find the probabilities of various distributions.
- iii. Know the relations among the different distributions.
- iv. Know some standard discrete and continuous probability distributions with real life situations
- v. Understand the concept of multinomial distribution.
- vi. Concepts of Demography.
- vii. Know the elementary Knowledge of sampling theory.
- viii. Apply of the small sample tests and large sample tests in various situations.
- ix. Apply the S.Q.C techniques in industrial field.
- x. Know the multiple regression, multiple and partial correlation coefficients.

## Paper-V Continuous Probability Distributions- I

### 1. Continuous Univariate Distributions (15)

1.1 Definition of the continuous sample space with illustrations, definition of continuous random variable (r.v.), probability density function (p.d.f.) and cumulative distribution function (c.d.f.) of continuous r.v., statement of properties of cumulative distribution function, sketch of p.d.f. and c.d.f.

1.2 Expectation of r.v., expectation of a function of r.v, mean, median, mode, quantiles (partition values), harmonic mean, variance, raw and central moments, skewness, kurtosis, examples.

1.3 Moment generating function (m.g.f.)  $M_x(t)$ : definition, properties.

- i) Standardization property  $M_x(0) = 1$
- ii) Uniqueness property of m.g.f (if exists), (without proof)
- iii) Effect of change of origin and scale. Generation of raw and central moments.

Definition of cumulant generating function.

1.4 Transformation of continuous univariate r.v.: Distribution of  $Y=g(X)$  ( $g$  is monotonic and non-monotonic), application of m.g.f. in transformation of r.v.

1.5 Examples and problems.

### 2. Continuous bivariate distributions. (15)

2.1 Definition of bivariate continuous r.v.  $(X,Y)$ , joint p.d.f, marginal and conditional distributions. Evaluation of probabilities of various region bounded by straight lines.

2.2 Expectation of  $g(X,Y)$ , means, variances, covariance, correlation coefficient, conditional expectation, proof of  $E[E(X/y)]=E(X)$ , conditional variance, regression as conditional expectation.

2.3 Independence of r.v.s, theorems on expectation.

- i)  $E(X+Y) = E(X) + E(Y)$
- ii)  $E(XY) = E(X).E(Y)$ , when X and Y are independent.

M.g.f. of sum of two independent r.v.s as a product of their m.g.f.s, extension to several variables.

2.4 Transformation of continuous bivariate r.v.s : Distribution of bivariate r.v.'s using jacobian of transformation.

2.5 Examples and problems.

**3. Uniform and Exponential Distribution: (10)**

3.1 Uniform distribution: p.d.f,

$$f(x) = \begin{cases} \frac{1}{b-a} & a \leq x \leq b \\ 0 & \text{elsewhere} \end{cases}$$

Notation :  $X \sim U(a,b)$ , sketch of p.d.f for various values of parameters, c.d.f, mean,

variance, m.g.f., moments,  $\beta_1$  and  $\beta_2$  coefficients. Distribution of i)  $Y = \frac{X-a}{b-a}$

ii)  $Y = \frac{b-X}{b-a}$     iii)  $Y = F(x)$  where  $F(x)$  is c.d.f. of any continuous r.v. X.

3.2 Exponential distribution : p.d.f. ( one parameter)

$$f(x) = \begin{cases} \theta e^{-\theta x} & x > 0, \theta > 0 \\ 0 & \text{elsewhere} \end{cases}$$

Notation :  $X \sim \text{Exp}(\theta)$ , sketch of p.d.f for various values of parameters, c.d.f, m.g.f, mean,

variance, coefficient of variation, moments,  $\beta_1$  and  $\beta_2$  coefficients, median, quartiles, lack of memory property, distribution of  $-(1/\theta) \log X$ ,  $-(1/\theta) \log(1-X)$ , where  $X \sim U(0,1)$ . Exponential distribution with scale and location parameters.

## Paper VI: Discrete probability distributions and Statistical methods

### 1. Standard discrete distributions: (20)

1.1 Poisson distribution : Probability mass function (p.m.f)

$$P[X=x] = P(x) = \frac{e^{-\lambda} \lambda^x}{x!}, \quad x = 0, 1, 2, 3, \dots, \lambda > 0$$

$$= 0 \quad \text{otherwise}$$

Notation :  $X \sim P(\lambda)$ . Mean, variance, moments(up to fourth order), probability generating function (p.g.f), recurrence relation for Poisson probabilities, additive property, conditional distribution of X given X+Y where X and Y are independent r.v.s Poisson distribution as a limiting case of binomial distribution, illustration of Poisson distribution in real life situations and examples

1.2 Geometric distribution: p.m.f.

$$P[X=x] = P(x) = q^x p, \quad x=0, 1, 2, \dots, 0 < p < 1, q = 1 - p$$

$$= 0 \quad \text{otherwise}$$

Notation :  $X \sim G(p)$ . Mean, variance, distribution function, p.g.f., lack of memory property.

Waiting time distribution : p.m.f.

$$P[Y = y] = p q^{y-1}, \quad y = 1, 2, 3, \dots$$

$$= 0 \quad \text{otherwise}$$

Mean, variance and p.g.f. by using relation with geometric. Examples.

1.3 Negative Binomial distribution : p.m.f.

$$P[X=x] = P(x) = \binom{x-1}{k-1} p^k q^{x-k}, \quad x = 0, 1, 2, 3, \dots; k > 0, 0 < p < 1, q = 1 - p$$

$$= 0 \quad \text{otherwise}$$

Notation :  $X \sim NB(k, P)$ . Geometric distribution is a particular case of Negative Binomial

distribution, mean, variance, p.g.f., recurrence relation of probabilities, additive property, NB( k, p ) as a sum of k i.i.d geometric r.v.s, illustration of Negative Binomial distribution in real life situations and simple examples.

1.4 Multinomial distribution: p.m.f., m.g.f., means, variances and covariance using m.g.f. marginal distribution.

**2. Multiple linear regression ( for tri-variate case): (10)**

2.1 Plane of regression, Yule's notation, correlation matrix.

2.2 Fitting of regression plane by method of least squares, definition of partial regression coefficients and their interpretation

2.3 Residual : definition, order, properties, derivation of mean and variance.

**3. Multiple and partial correlations: (10)**

3.1 Definition of multiple correlation coefficient  $R_{i,jk}$ , derivation of formula for multiple correlation coefficient.

3.2 Properties of multiple correlation coefficient : i)  $0 \leq R_{i,jk} \leq 1$ , ii)  $R_{i,jk} \geq |r_{ij}|$ , iii)  $R_{i,jk} \geq |r_{ik}|$

$i=j=k=1,2,3. i \neq j, j \neq k.$

3.3 Interpretation of i)  $R_{i,jk} = 1$  and ii)  $R_{i,jk} = 0$

3.4 Definition of partial correlation coefficient  $r_{ij.k}$ , derivation of formula for  $r_{ij.k}$

3.5 Properties of partial correlation coefficient i)  $-1 \leq r_{ij.k} \leq 1$ , and ii)  $b_{ij.k} * b_{ji.k} = r_{ij.k}^2$ . Effect of partial correlation coefficient on regression estimate ( Larger the regression coefficients better is the regression estimate).

3.6 Examples and problems.

## Semester -IV

### PAPER VII: Continuous Probability Distributions II

#### 1. Gamma, Beta and Normal Distribution: (25)

##### 1.1 Gamma distribution: p.d.f ( two Parameters)

$$f(x) = \frac{\alpha^\lambda}{\Gamma(\lambda)} e^{-\alpha x} x^{\lambda-1}, \quad x > 0, \alpha > 0, \lambda > 0$$
$$= 0 \quad \text{elsewhere}$$

Notation :  $X \sim G(\alpha, \lambda)$ , sketch of p.d.f for various values of parameters, special cases

i)  $\alpha=1$  ii)  $\lambda=1$ , mean, mode, variance, moments,  $\beta_1, \beta_2, \gamma_1$  and  $\gamma_2$  coefficients, additive property, distribution of sum of i.i.d. exponential variates.

##### 1.2 Beta distribution of first kind: p.d.f

$$f(x) = \frac{1}{\beta(m, n)} x^{m-1} (1-x)^{n-1} \quad 0 < x < 1; \quad m, n > 0$$
$$= 0 \quad \text{elsewhere.}$$

Notation :  $X \sim \beta_1(m, n)$ , sketch of p.d.f for various values of parameters, symmetry around mean when  $m=n$ , mean, harmonic mean, mode, variance, uniform distribution as a particular case when  $m=n=1$ , distribution of  $(1-X)$ .

##### 1.3 Beta distribution of second kind: p.d.f

$$f(x) = \frac{1}{\beta(m, n)} \frac{x^{m-1}}{(1+x)^{m+n}} \quad x > 0; \quad m, n > 0$$
$$= 0 \quad \text{elsewhere.}$$

Notation :  $X \sim \beta_2(m, n)$ , mean, harmonic mean, mode, variance, uniform distribution of  $1/X$ . Relation between beta distribution of 1<sup>st</sup> kind and beta distribution of 2<sup>nd</sup> kind. Distribution of  $X+Y, X/Y,$  and  $X/(X+Y)$ , where  $X$  and  $Y$  are independent gamma variates.

#### 1.4 Normal distribution : p.d.f.:

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} \quad -\infty < x < \infty \quad -\infty < \mu < \infty \quad \sigma > 0$$

Notation :  $X \sim N(\mu, \sigma^2)$ , sketch of p.d.f for various values of parameters, properties of normal curve, mean, median, mode, variance, quartiles, point of inflexion, moments, recurrence relation for central moments, m.g.f.,  $\beta_1, \beta_2, \gamma_1, \gamma_2$  coefficients, standard normal distribution, additive property, distribution of  $X^2$  if  $X \sim N(0,1)$ , distribution of  $aX+bY+c$  when  $X$  and  $Y$  are independent normal r.v.s, normal as a limiting case of i) Binomial ii) Poisson (without proof), illustrations of use of normal distribution in various fields.

## 2. Exact sampling distribution : (15)

### 2.1 Chi-square distribution:

Definition of chi-square variate as a sum of square of  $n$  i.i.d standard normal variates, derivation of p.d.f of  $\chi^2$  with  $n$  degrees of freedom (d.f.) using m.g.f. Sketch of p.d.f for various values of parameters(d.f), mean, mode, variance, moments, skewness, kurtosis, m.g.f., additive property, relation with gamma distribution, Normal approximation to  $\chi^2$ .

### 2.2 Students t- distribution:

Definition of t- variate with  $n$  d.f. in the form  $t = \frac{U}{\sqrt{\frac{\chi^2}{n}}}$  where  $U \sim N(0,1)$  and

$\chi^2$  is chi-square variate with  $n$  d.f. and  $U$  and  $\chi^2$  are independent r.v.s, derivation of p.d.f., sketch of p.d.f for various values of parameters, mean, mode, variance, moments,  $\beta_1, \beta_2, \gamma_1, \gamma_2$  coefficients.

### 2.3 Snedecor's F- distribution:

Definition of F- variate with  $n_1$  and  $n_2$  d.f. as  $F = \frac{\chi_1^2/n_1}{\chi_2^2/n_2}$  where  $\chi_1^2$  and  $\chi_2^2$  are

independent chi-square variates with  $n_1$  and  $n_2$  d.f. respectively, mean, mode, variance. Interrelation between t, F and  $\chi^2$ .



## Paper VIII Applied Statistics

### 1. Sampling Theory: (10)

- 1.1 Definition of population, sample, statistic, parameter, sample survey, census survey. Advantages of sample survey over census survey.
- 1.2 Methods of sampling: i) Deliberate (purposive) sampling ii) probability sampling and iii) Mixed sampling.
- 1.3 Simple random sampling (SRS): SRS with and without replacement. Proof of i) Expected value of sample mean is population mean ii) Expected value of product of population size and sample mean is population total. iii) Expected value of sample mean square is population mean square. iv) Variance of sample mean =  $S^2/n$  v) Variance of sample mean =  $S^2/n$  vi) Estimated variance of sample mean =  $s^2/n$ . Standard error of sample mean, comparison of SRSWR and SRSWOR.

### 2. Tests of Hypothesis: (10)

- 2.1 Notion of hypothesis, null and alternative hypothesis, simple and composite hypothesis, test statistic, critical region, idea of one and two tailed test, type I and type II errors, level of significance, p-value. Statement of Central Limit Theorem (CLT) for independently identically distributed (i.i.d) r.v.s
- 2.2 Large sample tests : Construction of test statistic and identification of its probability distribution.
- a) Tests for means i)  $H_0 : \mu = \mu_0$  ii)  $H_0 : \mu_1 = \mu_2$ .
- b) Tests for proportion: i)  $H_0 : P_0 = P_1$  ii)  $H_0 : P_1 = P_2$ .
- c) Tests for population correlation coefficient: i)  $H_0 : \rho = \rho_0$  ii)  $H_0 : \rho_1 = \rho_2$ , using Fisher's Z transformation.
- 2.3 Small sample tests : If  $X_1, X_2, \dots, X_n$  is a r.s from  $N(\mu, \sigma^2)$  then  $\bar{X}$  and  $S^2$  are independently distributed (without proof), construction of test statistic and identification of distribution of test statistic.
- a) t tests for means: i)  $H_0 : \mu = \mu_0$  ( $\sigma$  is unknown), ii)  $H_0 : \mu_1 = \mu_2$  ( $\sigma_1 = \sigma_2$  is unknown) unpaired t test. iii)  $H_0 : \mu_1 = \mu_2$  (paired t test).

b)  $\chi^2$  tests :

- i) test for population variance ( when mean is given and not given) ii) test for goodness of fit, iii) tests for independence of attributes (a) M X N contingency table (b) 2 X 2 contingency table, Yate's correction for continuity (concept only).

c) F tests : test for equality of population variance.

**3. Statistical Quality Control (SQC):** **(12)**

3.1 Meaning and purpose of SQC, quality of product, process control, product control, assignable

causes, chance causes, Shewhart's control chart: construction, working, theoretical basis

( $3\sigma$  limits) lack of control situation.

3.2 Control charts for variables : Control chart for process average ( $\bar{X}$ ), control chart for process

variation (R), Construction and working of  $\bar{X}$  and R chart for unknown standards, revised control limits, estimate of process s.d

3.3 Control charts for attributes: Defects, defectives, fraction defective, control chart for fraction defectives ( P chart) for fixed sample size and unknown standards, construction, working of

chart, revised control limits.

3.4 Control chart for number of defects(C chart): for standards are not given, construction and

working of the chart, revised control limits.

**4. Elements of Demography:** **(08)**

4.1 Introduction and need of vital statistics.

4.2 Mortality rates : Crude Death Rate (CDR) ,Specific Death Rate ,Standard Death Rate

4.3 Fertility rates : Crude Birth Rate (CBR),General Fertility Rate (GFR),Age Specific Fertility

Rate(ASFR),Total Fertility Rate (TFR).

6.4 Reproduction rate : Gross Reproduction Rate (GRR), Net Reproduction Rate(NRR).

4.5 Illustrative examples.

## Practical Course at B.Sc. Part- II

### Objectives:

By the end of course students are expected to:

- i. Compute probabilities of standard probability distributions.
- ii. Compute the expected frequency and test the goodness of fit.
- iii. Drawing random samples from standard probability distributions.
- iv. Compute the multiple and partial correlation coefficients.
- v. Selection of samples by SRS.
- vi. Computation and interpretation of vital statistics.
- v. Construction of control chart.
- vi. Interpretation of results obtained by using MS-Excel.

### PRACTICAL –II

1. Fitting of Discrete Uniform distribution and test for goodness of fit.
2. Fitting of Binomial distribution and test for goodness of fit.
3. Fitting of Hyper-geometric distribution and test for goodness of fit.
4. Fitting of Poisson distribution and test for goodness of fit.
5. Fitting of Geometric distribution and test for goodness of fit.
6. Fitting of Negative Binomial distribution and test for goodness of fit.(k should be taken to the next integer.)
7. Model sampling from of Discrete Uniform and Binomial distribution.
8. Model sampling from of Hyper-geometric distribution
9. Model sampling from of Poisson and Geometric distribution
10. Model sampling from of Negative Binomial distribution

11. Fitting of Continuous Uniform distribution and test for goodness of fit.
12. Fitting of Exponential distribution and test for goodness of fit.
13. Fitting of Normal distribution and test for goodness of fit.
14. Model sampling from Continuous Uniform and Exponential distribution.
15. Model sampling from Normal distribution.
16. Application of Exponential and Normal distributions.
17. Fitting of Binomial, Poisson & Negative Binomial distribution using MS-Excel.
18. Fitting of Exponential & Normal distribution using MS-Excel.
19. Model sampling from continuous Uniform and Exponential distributions by using MS-Excel.
20. Model sampling from Normal distribution by using MS-Excel.

### **PRACTICAL –III**

1. Fitting of straight lines and second degree curves.
2. Fitting of curves of type  $Y = a.b^X$ ,  $Y = a.X^b$  and  $Y = a.e^{bX}$
3. Multiple regressions.
4. Multiple and partial correlation.
5. Large sample tests for means.
6. Large sample tests for proportions.
7. Tests for population correlation coefficients (Using Fisher's Z transformation)
8. Tests based on Chi-square distribution.  
(Test for population variance, Test for goodness of fit)
9. Tests for independence.
10. Tests based on t distribution ( $\mu = \mu_0$ ,  $\mu_1 = \mu_2$ , paired and unpaired)
11. Tests based on F distribution ( $\sigma_1^2 = \sigma_2^2$ )

12. Construction of  $\bar{x}$  and R chart.
13. Construction of P and C chart.
14. Application of Poisson, Geometric & Negative Binomial distributions.
15. Application of multinomial distribution.
16. Simple random sampling (with and without replacement).
17. Demography-I (Mortality Rates)
18. Demography-II ( Fertility Rates, Population Growth)
19. Fitting of Straight line, parabola, and exponential curves using MS-EXCEL.
20. Multiple, partial correlation and partial regression coefficients using MS-EXCEL.

Note:

- i) Computer printouts are to be attached to the journal.
- ii) Observation table and/or calculations using statistical formulae should be done by MS-EXCEL and verify by using library functions.
- iii) Student must complete the entire practical to the satisfaction of the teacher concerned.
- iv) Student must produce the laboratory journal along with the completion certificate duly signed by Head of Department at the time of practical examination.

**Laboratory requirements:**

Laboratory should be well equipped with sufficient number of electronic calculators and computers along with necessary software, printers and UPS.

# Solapur University, Solapur



## Nature of Question Paper For Semester Pattern

### • Faculty of Science

(w.e.f. June 2011)

Time :- 2 hrs.

Total Marks-50

**Q. No.1) Multiple choice questions. (10)**

1) -----

a)            b)            c)            d)

2)

3)

4)

5)

6)

7)

8)

9)

10)

**Q.No.2) Answer any Five of the following (10)**

i)

ii)

iii)

iv)

v)

vi)

**Q.No.3) A) Answer any Two of the following (06)**

i)

ii)

iii)

**B) Write the Answer/Solve/Problem/Note (04)**

**Q.No.4) Answer any Two of the following (10)**

i)

ii)

iii)

**Q.No.5) Answer any Two of the following (10)**

i)

ii)

iii)

### Equivalence of theory Papers :

Old syllabus	New syllabus
<b>Paper:-III:</b> Continuous Probability distributions – 100 marks	Paper: V Continuous Probability distributions I. 50 marks Paper: VII Continuous Probability distributions II 50 marks
<b>Paper:-IV:</b> Discrete probability distributions and Statistical methods -100 marks	Paper: VI Discrete Probability distributions and Statistical methods 50 marks Paper: VIII Applied Statistics 50 marks

### Nature of Practical question paper of B.Sc. Part-II

- Each practical paper of 50 marks, containing four questions each of 20 marks and students has solve two questions. In only one of four questions there shall be a sub question of about 10 marks based on MS-EXCEL.
- Evaluation of MS-EXCEL based question will be on line and should be demonstrated to the examiner.
- Five marks are reserved for journal and five marks for oral examination.
- Practical examination is of FOUR hour duration which includes oral examination and online demonstration.

**Reference Books for Paper-III and Paper –IV**

Sr.No.	Name of the Authors	Title
1.	Hogg R.V. and Craig A.T.	Introduction to Mathematical Statistics (Third edition), Macmillan Publishing, New York.
2.	Gupta S.C. & Kapoor V.K	Fundamentals of Mathematical Statistics Sultan Chand & sons, New Delhi
3.	Gupta S.C. & Kapoor V.K	Fundamentals of Applied Statistics Sultan Chand & sons, New Delhi
4.	Mood A.M., Graybill F.A and Boes D.C.	Introduction to theory of Statistics Tata McGraw Hill, New Delhi
5.	Walpole R.E & Mayer R.H.	Probability and Statistics MacMillan Publishing Co. Inc, New York
6	Duncan A.J	Quality control and Industrial Statistics D.B.Tataporewala & Sons Co. Mumbai
7.	Mayer P.L	Introductory probability & Statistical Applications. Oxford & IBH Publication Co. 66 Janpath New Delhi.
8.	Kapoor J.N & Saxana H.C	Mathematical Statistics Sultan Chand & sons, New Delhi
9.	Goon A.M., Gupta A.K. and Dasgupta	Fundamentals of Statistics (vol. I &II) The world calcutta Press Pvt.Ltd., Calcutta
10.	Rohatgi V.K	Introduction to Probability theory & Mathematical Statistics Wiley Eastern Limited.
11.	Kangji K.	100 Statistical Tests
12.	Kulkarni M.B., Gore A.P. & Ghatpande S.B.	Common Statistical Tests. Satyajeet Prakashan, Pune
13.	Gupta S.D.	Statistical Methods. Sultan Chand & sons, New Delhi
14.	Gupta S.C.	Fundamentals of Statistics. Himalaya Publishing House, Mumbai.
15.	Grant E.L.	Statistical Quality Control.
16.	Gupta S.P.	Statistical Method.
17.	Montgomery	Introduction to Statistical Quality Control
18.	Srivastav D.S.	A text book of Demography



## 1. Structure of the courses :-

- A) Each paper of every subject for Arts, Social Sciences & Commerce Faculty shall be of 50 marks as resolved by the respective faculties and Academic Council.
- B) For Science Faculty subjects each paper shall be of 50 marks and practical for every subject shall be of 50 Marks as resolved in the faculty and Academic Council.
- C) For B. Pharmacy also the paper shall be of 50 marks for University examination. Internal marks will be given in the form of grades.
- D) For courses which were in semester pattern will have their original distribution already of marks for each paper.
- E) For the faculties of Education, Law, Engineering the course structure shall be as per the resolutions of the respective faculties and Academic Council.

## 2. Nature of question paper:

### A) Nature of questions.

“20% Marks - objectives question” **(One mark each and multiple choice questions)**

“40% Marks - Short notes / Short answer type questions / Short Mathematical type questions/ Problems. **(2 to 5 Marks each)**

“40% Marks - Descriptive type questions / Long Mathematical type questions / Problems. **(6 to 10 Marks each)**

- B) Objective type question will be of multiple choice (MCQ) with four alternatives. This answer book will be collected in first 15 minutes for 10 marks and in first 30 minutes for 20 marks. Each objective question will carry one mark **each**.
- C) Questions on any topic may be set in any type of question. All questions should be set in such a way that there should be permutation and combination of questions on all topics from the syllabus. As far as possible it should cover entire syllabus.
- D) There will be only five questions in the question paper. All questions will be compulsory. There will be internal option **(30%)** and not overall option. **for questions 2 to 5.**

**3.** Practical Examination for B. Sc. I. will be conducted at the end of second semester.

**4.** Examination fees for semester Examination will be decided in the Board of Examinations.

The structures of all courses in all Faculties were approved and placed before the Academic Council. After considered deliberations and discussion it was decided not to convene a meeting of the Academic Council for the same matter as there is no deviation from any decision taken by Faculties and Academic Council. Nature of Question Paper approved by Hon. Vice Chancellor on behalf of the Academic Council.