

B.A/B. Sc-II Semester-III

Paper-I (ST-301)

Time: 3 Hours

M.M.:B. Sc: 40+10*

B.A: 28+7*

* Internal Assessment

Elementary Inference

Note : There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four units uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all selecting one question from each unit and the compulsory one. All the questions will carry equal marks except the compulsory question, the distribution of marks for which will be as follows:-

B.Sc.8 marks and B.A. 6 marks.

UNIT-I

Statistical Estimation : Parameter and statistic, Basic concept of sampling distribution. Point and interval estimate of a parameter, concept of bias and standard error of an estimate. Standard errors of sample mean, sample proportion, standard deviation, Properties of a good estimator: Unbiasedness, Efficiency, Consistency and Sufficiency (definition and illustrations).

UNIT-II

Methods of Estimation : Method of moments, method of maximum likelihood and its properties (without proof). Estimation of parameters of Binomial, Poisson and Normal distributions

UNIT-III

Testing of Hypotheses : Null and alternative hypotheses. Simple and composite hypotheses, critical region, level of significance, one tailed and two tailed testing, Types of errors, BCR, Neyman- Pearson Lemma, Test of simple hypothesis against a simple alternative in case of Binomial, Poisson and Normal distributions.

UNIT-IV

Large Sample Tests : Testing of a single mean, single proportion, difference of two means and two proportions. Fisher's Z transformation. Determination of confidence interval for mean, variance and proportion.

Books recommended

S. No.	Title of Book	Name of author	Publisher
1.	Statistics:A Foundation For Analysis	Hughes A. & Grawoig D.	Addision Wesley
2.	A First Course on Parametric Inference	Kale B.K.	Narosa
3.	Introduction to Theory of Statistics	Mood A.M., Graybill F.A. & Boes D.C.	McGraw Hill
4.	Introduction to Mathematical Statistics	Hoel P.G.	Asia Pub. House
5.	Mathematical Statistics With Applications	Freund's J.E.	Prentice Hall
6.	Introduction to Mathematical Statistics	Hogg and Craig	Prentice Hall

B.A/B. Sc-II Semester-III

Paper-II (ST-302)

Time: 3 Hours

M.M.:B. Sc: 40+10*

B.A: 28+7*

* Internal Assessment

Sample Surveys

Note : There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four units uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all selecting one question from each unit and the compulsory one. All the questions will carry equal marks except the compulsory question, the distribution of marks for which will be as follows:-

B.Sc.8 marks and B.A. 6 marks.

UNIT-I

Concepts of census and sample survey, basic concepts in sampling. Sampling and Non-sampling errors. Principal steps involved in a sample survey; bias, precision and accuracy, advantages of sampling over complete census, limitations of sampling, different methods of data collection.

UNIT-II

Basic sampling methods: Simple random sampling (SRS) with and without replacement, use of random number tables, estimation of mean and variance in case of SRS. Simple random sampling of attributes, size of simple random sample.

UNIT-III

Stratified random sampling, estimation of population mean, variance of the estimate of population mean in stratified random sampling, allocation of sample size, proportional allocation, optimum allocation. Comparison of Stratified random sampling with SRS.

UNIT-IV

Systematic random sampling, estimation of mean and variance. Comparison of Systematic random sampling with SRS and Stratified random sampling.

Books recommended

S. No.	Title of Book	Name of author	Publisher
1.	Sampling Techniques	Cochran W.G.	Wiley Publishers
2.	Sampling Theory	Des Raj and Chandok	Narosa

- | | | | |
|----|--|------------------------------|-----------------------------|
| 3. | Sample Theory of Surveys with Applications | Sukhatme et. all | Low State Uni. Press & IARS |
| 4. | Survey Sampling | Mukhopadhyay P. | Narosa Publishing Society |
| 5. | Sampling Techniques | Daroga Singh & Chaudhry, F.S | New age International |

B.A/ B. Sc-II Semester-IV

Paper-I (ST-401)

Time: 3 Hours

M.M.:B. Sc: 40+10*
B.A: 28+7*

* Internal Assessment

Parametric and Non-parametric tests

Note : There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four units uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all selecting one question from each unit and the compulsory one. All the questions will carry equal marks except the compulsory question, the distribution of marks for which will be as follows:-

B.Sc.8 marks and B.A. 6 marks.

UNIT-I

Chi-square distribution : Definition, derivation, moment generating function, cumulant generating function, mean, mode, skewness, additive property, conditions for the validity, chi-square test for goodness of fit. Contingency table, coefficient of contingency, test of independence of attributes in a contingency table.

UNIT-II

Student's 't' and Snedecor's 'F' statistics: Definition and derivation of Student's 't', constants of t- distribution, limiting form of t- distribution. Definition & derivation of Snedcor's F-distribution, constants of F-distribution, mode of F-distribution. Relationship between t, f and chi-square distribution.

UNIT-III

Testing for the mean and variance of univariate normal distribution, testing of equality of two means and testing of equality of two variances of two univariate normal distributions. Testing for the significance of sample correlation coefficient in sampling from bivariate normal distribution.

UNIT-IV

Nonparametric Tests: Definition of order statistics. Sign test for univariate and bivariate distribution, run test, median test, Kolmogorov- Smirnov one sample test, Kolmogorov-Smirnov two sample test, Mann Whitney U-test (only applications without derivation).

Books recommended

S. No.	Title of Book	Name of author	Publisher
1.	Introduction to Probability and Its Application	Feller W.	Wiley Publisher
2.	Fundamentals of Statistics, Vol. I	Goon A.M., Gupta & M.K. Dasgupta B.	World Press Calcutta
3.	Random Variable and Probability Distribution	Cramer H.	Cambridge Uni. Press
4.	Fundamentals of Mathematical Statistics	Gupta S.C. & Kapoor V.K.	Sultan Chand & Sons
5.	Practical Nonparametric	W.J. Conover	Wiley Publisher

B.A/ B. Sc-II Semester-IV
Paper-II (ST-402)

Time: 3 Hours

M.M.:B. Sc: 40+10*
B.A: 28+7*

* Internal Assessment

Design of Experiments

Note : There will be nine questions in all. Question No.1 will be compulsory covering whole of the syllabus and comprising 5 to 8 short answer type questions. Rest of the eight questions will be set from the four units uniformly i.e. two from each unit. The candidate will be required to attempt five questions in all selecting one question from each unit and the compulsory one. All the questions will carry equal marks except the compulsory question, the distribution of marks for which will be as follows:-

B.Sc.8 marks and B.A. 6 marks.

UNIT-I

Analysis of variance (ANOVA): Definition and assumptions for ANOVA. Analysis of variance for one-way classification and two-way classifications for fixed effect models with one observation per cell.

UNIT-II

Introduction to design of experiments, terminology: experiment, treatment, experimental unit, blocks, experimental error, replication, precision, efficiency of a design, need for design of experiments, size and shape of plots and blocks. Fundamental principles of design: randomization, replication and local control.

UNIT-III

Completely randomized design (CRD), Randomized Block Design (RBD), their layout, statistical analysis, applications, advantages and disadvantages. Efficiency of RBD relative to CRD.

UNIT-IV

Latin square design (LSD): Layout, statistical analysis, applications, merits and de- merits of LSD. Factorial designs: Definition, advantages and disadvantages.

Books recommended

S. No.	Title of Book	Name of author	Publisher
1.	Design and Analysis Of Experiments	Das M.N. & Giri	Springer Verlage
2.	Linear Models	Searle S.R.	John Wiley & Sons
3.	Linear Estimation And Design of Experiments	Joshi D.D.	Wiley Eastern
4.	Fundamentals of Applied Statistics	Gupta S.C. & Kapoor V.K.	Sultan Chand & Sons

B.A/B. Sc-II

**Paper-III (Practical
ST-403)**

Time: 3 Hours
Sc: 100

Max. Marks: B.

B.A: 60

Practical

Note: Five questions will be set. The candidate will be required to attempt any three.

1. To apply large sample test of significance for single proportion and difference of two proportions and obtained their confidence intervals.
2. To apply large sample test of significance for single mean and to obtained confidence interval.
3. To apply large sample test of significance for difference between two means and standard deviations.
4. To apply t-test for testing single mean and difference between means and to obtain their confidence intervals.
5. To apply paired t-test for difference between two means.
6. To apply Chi-square test for goodness of fit.
7. To apply Chi-square test for independence of attributes.
8. To apply test of significance of sample correlation coefficient.
9. To apply F-test for testing difference of two variances.
10. To apply sign test for given data.
11. To apply Run test for given data.
12. To apply Median test for given data.
13. To apply Mann Whitney U-test for given data.
14. To find standard error of estimate of population mean in case of SRSWR & SRSWOR and comparison of these estimates.
15. To find standard error of estimate of population mean in case of stratified random sampling.
16. To find standard error of estimate of population mean in case of systematic sampling.
19. To perform ANOVA in case of CRD and test whether the treatments/varieties are equally effective.
20. To perform ANOVA for an RBD.
21. To perform ANOVA for an LSD.

Distribution of marks:

	B. Sc.	B.A
Class Record:	10	06
Viva Voce:	10	06
Practical:	80	48

Scheme & Examination of B.Sc. IInd Year Hindi Compulsary IIIrd & IVth. Sem.)

Existing (Session 2010-2011)

IIIrd. Sem. 2010-2011

Name of Paper	Max. Mark	Theory	Internal
Hindi Compulsary	50	40	10

IVth. Sem. 2010-2011

Name of Paper	Max. Mark	Theory	Internal
Hindi Compulsary	50	40	10

Head. Dept. of Hindi

हिन्दी अनिवार्य
बी०एस०सी० द्वितीय वर्ष
तृतीय सेमेस्टर

समय : ३ घण्टे
पूर्णांक : ४०
आंतरिक मूल्यांकन : १०

पाठ्य विषय

- आठ अर्वाचीन कवि : संपा० डॉ० लालचंद गुप्त 'मंगल' एवं मदन गुलाटी, कुरुक्षेत्र विश्वविद्यालय प्रकाशन १५ अंक

निर्देश

सप्रसंग व्याख्यार्थ दिए गए चार अंशों में से दो की व्याख्या करनी होगी । पूछे गए दो कवियों में से एक कवि का साहित्यिक परिचय लिखना होगा । व्याख्या के लिए 2X5=10 तथा कवि परिचय के लिए ५ अंक निर्धारित हैं ।

- **निबंध लेखन**

निर्धारित निबंध :

- १ मानवाधिकार २ नैतिक शिक्षा ३ मद्य निषेध ४ विज्ञान और औद्योगीकरण
५ वैज्ञानिक पद्धति में भारत का योगदान ६ वैश्वीकरण और विज्ञान ७ दूरदर्शन
८ समाचार पत्र ८ अंक

निर्देश

पाठ्यक्रम में निर्धारित आठ विषयों में से कोई चार विषय पूछे जाएंगे जिनमें से किसी एक पर निबंध लिखना होगा । इसके लिए ७ अंक निर्धारित हैं ।

पत्र-लेखन : सरकारी पत्र

७ अंक

निर्देश

पूछे गए किन्हीं दो सरकारी पत्रों में से परीक्षार्थी को एक पत्र लिखना होगा । इसके लिए सात अंक निर्धारित हैं ।

- **वैज्ञानिक शब्दावली**

निर्धारित शब्दावली

- | | |
|------------------|----------|
| 1. Aeronatics | वैमानिकी |
| 2. Afforestation | वनरोपण |

3. Alloy	मिश्र धातु
4. Amplifire	प्रवर्धक
5. Analysis	विश्लेषण
6. Antibodies	प्रतिजैविक
7. Atmosphere	वायुमंडल
8. Bicomex Lens	उभायेतल लेंस
9. Calculating Machine	परिकलन यंत्र
10. Calibration	अंशांकन
11. Calination	निस्तापन
12. Capillary	कोशिका
13. Catalyst	उत्प्रेरक
14. Caustic Alkli	दाहक क्षार
15. Central axis	केन्द्रीय अक्ष
16. Cerebelbem	प्रमस्तिष्कीय
17. Chromosomes	गुणसूत्र
18. Cluster	गुच्छ
19. Coefficient	गुणांक
20. Compound	मिश्र
21. Condensation	संघनन
22. Convection	संवहन
23. Convex	अवतल
24. Comet	धूमकेतू
25. Decomposition	विच्छेदन
26. Deflection	विक्षेप
27. Dehydration	निर्जलीकरण
28. Diffusion	विसरण
29. Distillation	आसवन
30. Ecology	परिस्थिति विज्ञान
31. Elasticity	प्रत्यास्था
32. Electro osmories	विद्युत परारसण
33. Equilibrium	संतुलन
34. Equivalent	तुल्यांक
35. Endothermic	रुष्माशोषी
36. Extraction	निष्कर्षण
37. Fermentation	किण्वन
38. Fertilization	निवेचन
39. Freezing	जमना
40. Fission	खंडन
41. Formula	सूत्र
42. Fossil	जीवाश्म
43. Friction	घर्षण

45. Germicide

जीवाणुनाशी

46. Gland

ग्रंथि

47. Graft

लमरोपना

48. Heater

तापक

49. Homologous

समजात

50. Hybrid

संकर

निर्देश

पाठ्यक्रम में निर्धारित ५० अंग्रेजी शब्दों में से १५ शब्द पूछे जाएंगे जिनमें से परीक्षार्थी को किन्हीं दस शब्दों के हिंदी-तकनीकी -अर्थ लिखने होंगे । इसके लिए दस अंक निर्धारित हैं ।

सहायक पुस्तकें

- १ प्रतियोगात्मक निबंध संचय : डॉ० चमनलाल गुप्त, मिनर्वा बुक हाउस, शिमला ।
- २ निबंध सौरभ : तनसुखराम गुप्त, सूर्य भारती प्रकाशन, दिल्ली ।
- ३ पत्र-व्यवहार निर्देशिका : डॉ० भोलानाथ तिवारी, वाणी प्रकाशन, दिल्ली ।
- ४ पत्र कौशल : तनसुखराम गुप्त, सूर्यभारती प्रकाशन, दिल्ली ।

हिन्दी अनिवार्य
बी०एस०सी० द्वितीय वर्ष
चतुर्थ सेमेस्टर

समय : ३ घण्टे
पूर्णांक : ४०
आंतरिक मूल्यांकन : १०

- संस्मरण : महादेवी वर्मा, राजपाल एंड संस, दिल्ली ।

१५ अंक

निर्देश

सप्रसंग व्याख्यार्थ दिए चार अंशों में से दो की व्याख्या करनी होगी । पूछे गए दो संस्मरणों में से एक का सार लिखना होगा । व्याख्या के लिए $2 \times 5 = 10$ तथा सार के लिए ५ अंक निर्धारित ह ।

निबंध लेखन

निर्धारित निबंध : १ महिलाधिकार २ गाँधी दर्शन ३ शिक्षा और राजनीति
४ विज्ञान और पर्यावरण प्रदूषण ५ विश्वविख्यात वैज्ञानिक और उनके आविष्कार
६ आकाशवाणी ७ कम्प्यूटर तथा इन्टरनेट ८ जनसंख्या विस्फोट

८ अंक

निर्देश

पाठ्यक्रम में निर्धारित आठ विषयों में से कोई चार विषय पूछे जाएंगे जिनमें से किसी एक पर निबंध लिखना होगा । इसके लिए ८ अंक निर्धारित हैं

पत्र लेखन : अर्ध सरकारी पत्र और तार लेखन

७ अंक

निर्देश

पाठ्यक्रम में निर्धारित अर्धसरकारी पत्र और तार में से दो पत्र पूछे जाएंगे जिनमें से परीक्षार्थी को एक पत्र लिखना होगा । इसके लिए ८ अंक निर्धारित हैं ।

निर्धारित शब्दावली	
1. Hydration	जलयोजन
2. Ignition	ज्वलन
3. Indicator	सूचक
4. Inertia	जड़त्व
5. Infection	संक्रमण
6. Insulation	रोधन
7. Intensity	तीव्रता
8. Intestine	आन्त्र
9. Latent heat	गुप्त उष्मा
10. Magnetism	चुम्बकत्व
11. Melting point	गलनांक
12. Membrane	झिल्ली
13. Metamorphosis	कायान्तरण
14. Microscope	सूक्ष्मदर्शी
15. Momentum	संवेग
16. Multiplier	गुणक
17. Nucleus	नाभिक
18. Nutrition	पोषण
19. Observation	प्रेक्षण
20. Obtuse angle	अधिक कोण
21. Orbital	कक्षाकार
22. Osmosis	परासरण
23. Ovary	अंडाशय
24. Parasite	परजीवी
25. Pendulum	लोलक
26. Pesticides	नाशकारक रसायन
27. Pharmaceutical	औषध रसायनक्ष
28. Photo-catalyst	प्रकाशित उत्प्रेरक
29. Physiology	शरीर क्रिया विज्ञान
30. Phenomenon	घटना
31. Plasma	जीव-द्रव्य
32. Pollution	प्रदूषण
33. Precipitate	अवक्षेप
34. Projectile	प्रक्षेपक
35. Projection	प्रक्षेपण
36. Qualitation	गुणात्मक
37. Quantile	विभाजक
38. Radiation	विकरण
39. Reflection	परावर्तन

40. Reflective index

परावर्तनांक

41. Refrigeration

प्रशीतन

42. Remainder theorem

शेषफल प्रमेय

43. Resonance

अनुनाद

44. Relic

अवशेष

45. Spectrum

वर्णक्रम

46. Sublimation

उदात्तीकरण

47. Thermoscope

तापदर्शी

48. Velocity

वेग

49. Vibration

कंपन

50. Virus

विषाणु

निर्देश

पाठ्यक्रम में निर्धारित ५० अंग्रेजी शब्दों में से १५ शब्द पूछे जाएंगे जिनमें से परीक्षार्थी को किन्हीं दस शब्दों के हिंदी-तकनीकी -अर्थ लिखने होंगे । इसके लिए दस अंक निर्धारित हैं ।

सहायक पुस्तकें

- १ प्रतियोगात्मक निबंध संचय : डॉ० चमनलाल गुप्त, मिनर्वा बुक हाउस, शिमला ।
- २ निबंध सौरभ : तनसुखराम गुप्त, सूर्य भारती प्रकाशन, दिल्ली ।
- ३ पत्र-व्यवहार निर्देशिका : डॉ० भोलानाथ तिवारी, वाणी प्रकाशन, दिल्ली ।
- ४ पत्र कौशल : तनसुखराम गुप्त, सूर्यभारती प्रकाशन, दिल्ली ।

BM-231
(Semester-III)
Advanced Calculus

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Continuity, Sequential Continuity, properties of continuous functions, Uniform continuity, chain rule of differentiability. Mean value theorems; Rolle's Theorem and Lagrange's mean value theorem and their geometrical interpretations. Taylor's Theorem with various forms of remainders, Darboux intermediate value theorem for derivatives, Indeterminate forms.

Section-II

Limit and continuity of real valued functions of two variables. Partial differentiation. Total Differentials; Composite functions & implicit functions. Change of variables. Homogenous functions & Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables.

Section-III

Differentiability of real valued functions of two variables. Schwarz and Young's theorem. Implicit function theorem. Maxima, Minima and saddle points of two variables. Lagrange's method of multipliers.

Section-IV

Curves: Tangents, Principal normals, Binormals, Serret-Frenet formulae. Locus of the centre of curvature, Spherical curvature, Locus of centre of Spherical curvature, Involutives, evolutes, Bertrand Curves. Surfaces: Tangent planes, one parameter family of surfaces, Envelopes.

REFERENCES

- C.E. Weatherburn : Differential Geometry of three dimensions, Radhe Publishing House, Calcutta
- Gabriel Klaumber : Mathematical analysis, Mrcel Dekkar, Inc., New York, 1975
- R.R. Goldberg : Real Analysis, Oxford & I.B.H. Publishing Co., New Delhi, 1970
- Gorakh Prasad : Differential
- Calculus, Pothishala Pvt. Ltd., Allahabad
- S.C. Malik : Mathematical Analysis, Wiley Eastern Ltd., Allahabad.
- Shanti Narayan : A Course in Mathemtical Analysis, S.Chand and company, New Delhi
- Murray, R. Spiegel : Theory and Problems of Advanced Calculus, Schaum Publishing co., New York

BM-232

(Semester-III)

Partial Differential Equations

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Partial differential equations: Formation, order and degree, Linear and Non-Linear Partial differential equations of the first order: Complete solution, singular solution, General solution, Solution of Lagrange's linear equations, Charpit's general method of solution. Compatible systems of first order equations, Jacobi's method.

Section-II

Linear partial differential equations of second and higher orders, Linear and non-linear homogenous and non-homogenous equations with constant co-efficients, Partial differential equation with variable co-efficients reducible to equations with constant coefficients, their complimentary functions and particular Integrals, Equations reducible to linear equations with constant co-efficients.

Section-III

Classification of linear partial differential equations of second order, Hyperbolic, parabolic and elliptic types, Reduction of second order linear partial differential equations to Canonical (Normal) forms and their solutions, Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order.

Section-IV

Cauchy's problem for second order partial differential equations, Characteristic equations and characteristic curves of second order partial differential equation, Method of separation of variables: Solution of Laplace's equation, Wave equation (one and two dimensions), Diffusion (Heat) equation (one and two dimension) in Cartesian Coordinate system.

REFERENCES

- D.A.Murray: Introductory Course on Differential Equations, Orient Longman, (India), 1967
- Erwin Kreyszing : Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999
- A.R. Forsyth : A Treatise on Differential Equations, Macmillan and Co. Ltd. 4. Ian N.Sneddon : Elements of Partial Differential Equations, McGraw Hill Book Company, 1988
- Frank Ayres : Theory and Problems of Differential Equations, McGraw Hill Book Company, 1972
- J.N. Sharma & Kehar Singh : Partial Differential Equations

BM-233
(Semester-III)

Statics

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Composition and resolution of forces. Parallel forces. Moments and Couples.

Section-II

Analytical conditions of equilibrium of coplanar forces. Friction. Centre of Gravity.

Section-III

Virtual work. Forces in three dimensions. Poinsots central axis.

Section-IV

Wrenches. Null lines and planes. Stable and unstable equilibrium.

REFERENCES

- S.L. Loney : Statics, Macmillan Company, London
- R.S. Verma : A Text Book on Statics, Pothishala Pvt. Ltd., Allahabad

BM-241
(Semester-IV)
Sequences and Series

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Boundedness of the set of real numbers; least upper bound, greatest lower bound of a set, neighborhoods, interior points, isolated points, limit points, open sets, closed set, interior of a set, closure of a set in real numbers and their properties. Bolzano- Weierstrass theorem, Open covers, Compact sets and Heine-Borel Theorem.

Section-II

Sequence: Real Sequences and their convergence, Theorem on limits of sequence, Bounded and monotonic sequences, Cauchy's sequence, Cauchy general principle of convergence, Subsequences, Subsequential limits. Infinite series: Convergence and divergence of Infinite Series, Comparison Tests of positive terms Infinite series, Cauchy's general principle of Convergence of series, Convergence and divergence of geometric series, Hyper Harmonic series or p-series.

Section-III

Infinite series: D-Alembert's ratio test, Raabe's test, Logarithmic test, de Morgan and Bertrand's test, Cauchy's Nth root test, Gauss Test, Cauchy's integral test, Cauchy's condensation test.

Section-IV

Alternating series, Leibnitz's test, absolute and conditional convergence, Arbitrary series: Abel's lemma, Abel's test, Dirichlet's test, Insertion and removal of parenthesis, rearrangement of terms in a series, Dirichlet's theorem, Riemann's Re-arrangement theorem, Pringsheim's theorem (statement only), Multiplication of series, Cauchy product of series, (definitions and examples only) Convergence and absolute convergence of infinite products.

REFERENCES

- R.R. Goldberg : Real Analysis, Oxford & I.B.H. Publishing Co., New Delhi, 1970
- S.C. Malik : Mathematical Analysis, Wiley Eastern Ltd., Allahabad.
- Shanti Narayan : A Course in Mathematical Analysis, S.Chand and company, New Delhi
- Murray, R. Spiegel : Theory and Problems of Advanced Calculus, Schaum Publishing co., New York
- T.M. Apostol: Mathematical Analysis, Narosa Publishing House, New Delhi, 1985
- Earl D. Rainville, Infinite Series, The Macmillan Co., New York

BM-242

(Semester-IV)

Special Functions And Integral Transforms

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Series solution of differential equations – Power series method, Definitions of Beta and Gamma functions. Bessel equation and its solution: Bessel functions and their properties Convergence, recurrence, Relations and generating functions, Orthogonality of Bessel functions.

Section-II

Legendre and Hermite differential equations and their solutions: Legendre and Hermite functions and their properties-Recurrence Relations and generating functions. Orthogonality of Legendre and Hermite polynomials. Rodrigues' Formula for Legendre & Hermite Polynomials, Laplace Integral Representation of Legendre polynomial.

Section-III

Laplace Transforms – Existence theorem for Laplace transforms, Linearity of the Laplace transforms, Shifting theorems, Laplace transforms of derivatives and integrals, Differentiation and integration of Laplace transforms, Convolution theorem, Inverse Laplace transforms, convolution theorem, Inverse Laplace transforms of derivatives and integrals, solution of ordinary differential equations using Laplace transform.

Section-IV

Fourier transforms: Linearity property, Shifting, Modulation, Convolution Theorem, Fourier Transform of Derivatives, Relations between Fourier transform and Laplace transform, Parseval's identity for Fourier transforms, solution of differential Equations using Fourier Transforms.

REFERENCES

- Erwin Kreyszing : Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999
- A.R. Forsyth : A Treatise on Differential Equations, Macmillan and Co. Ltd.
- I.N. Sneddon : Special Functions on mathematics, Physics & Chemistry.
- W.W. Bell : Special Functions for Scientists & Engineers.
- I.N. Sneddon: the use of integral transform, McGraw Hill, 1972
- Murray R. Spiegel: Laplace transform, Schaum's Series

BM-243

(Semester-IV)

PROGRAMMING IN C & NUMERICAL METHODS

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

Note: Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.

Section-I

Programmer's model of a computer, Algorithms, Flow charts, Data types, Operators and expressions, Input / outputs functions.

Section-II

Decisions control structure: Decision statements, Logical and conditional statements, Implementation of Loops, Switch Statement & Case control structures. Functions, Preprocessors and Arrays.

Section-III

Strings: Character Data Type, Standard String handling Functions, Arithmetic Operations on Characters. Structures: Definition, using Structures, use of Structures in Arrays and Arrays in Structures. Pointers: Pointers Data type, Pointers and Arrays, Pointers and Functions. Solution of Algebraic and Transcendental equations: Bisection method, Regula-Falsi method, Secant method, Newton-Raphson's method. Newton's iterative method for finding pth root of a number, Order of convergence of above methods.

Section-IV

Simultaneous linear algebraic equations: Gauss-elimination method, Gauss-Jordan method, Triangularization method (LU decomposition method). Crout's method, Cholesky Decomposition method. Iterative method, Jacobi's method, Gauss-Seidal's method, Relaxation method.

Part-B

Simple programs in C and the implementation of Numerical Methods, studied in the theory paper, in 'C' programming Language.

REFERENCES

- B.W. Kernighan and D.M. Ritchie : The C Programming Language, 2 nd Edition
- V. Rajaraman : Programming in C, Prentice Hall of India, 1994
- Byron S. Gottfried : Theory and Problems of Programming with C, Tata McGraw-Hill Publishing Co. Ltd., 1998
- M.K. Jain, S.R.K.Lyengar, R.K. Jain : Numerical Method, Problems and Solutions, New Age International (P) Ltd., 1996
- M.K. Jain, S.R.K. Lyengar, R.K. Jain : Numerical Method for Scientific and Engineering Computation, New Age International (P) Ltd., 1999
- Computer Oriented Numerical Methods, Prentice Hall of India Pvt. Ltd.
- Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill Publishing Co. Ltd.

DATA STRUCTURE

UNIT-I

Introduction: Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Applications of data structures, Algorithms complexity and time-space tradeoff, Big-O notation.

Strings: Introduction, strings, String operations, Pattern matching algorithms

UNIT – II

Arrays: Introduction, Linear arrays, Representation of linear array in memory, Traversal, Insertions, Deletion in an array, Multidimensional arrays, Parallel arrays, Sparse matrix.

Linked List: Introduction, Array vs. linked list, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list, Garbage collection, Applications of linked lists. Algorithm of insertion/ deletion in SLL .

UNIT – III

Stack: primitive operation on stack, algorithms for push and pop. Representation of Stack as Linked List and array, Stacks applications : polish notation, recursion. Introduction to queues, Primitive Operations on the Queues, Circular queue, Priority queue, Representation of Queues as Linked List and array, Applications of queue. Algorithm on insertion and deletion in simple queue and circular queue.

UNIT – IV

Trees - Basic Terminology, representation, Binary Trees, Tree Representations using Array & Linked List, Basic operation on Binary tree, Traversal of binary trees:- In order, Preorder & post order, Applications of Binary tree. Algorithm of tree traversal with and without recursion.

Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs.

TEXT BOOKS

1. Seymour Lipschutz, "Data Structures", Tata McGraw- Hill Publishing Company Limited, Schaum's Outlines, New Delhi.
2. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Pearson Education., New Delhi.

REFERENCE BOOKS

1. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications", Mcgraw- Hill International Student Edition, New York.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Addison - Wesley, (An Imprint Of Pearson Education), Mexico City.

B.Sc Computer Science Semester IV

PAPER I: Object Oriented Programming with C++

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Maximum Marks: 50

External: 40

Minimum Pass Marks: 18

Internal: 10

Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/ short -answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I

Object oriented Programming: Object-Oriented programming features and benefits. Object-Oriented features of C++, Class and Objects, Data Hiding & Encapsulation, Structures, Data members and Member functions, Scope resolution operator and its significance, Static Data Members, Static member functions, Nested and Local Class, Accessing Members of Class and Structure.

UNIT – II

Constructor, Initialization using constructor, types of constructor– Default, Parameterized & Copy Constructors, Constructor overloading, Default Values to Parameters, Destructors, Console I/O: Hierarchy of Console Stream Classes, Unformatted and Formatted I/O Operations.

UNIT – III

Manipulators, Friend Function, Friend Class, Arrays, Array of Objects, Passing and Returning Objects to Functions, String Handling in C++, Dynamic Memory Management: Pointers, new and delete Operator, Array of Pointers to Objects, this Pointer, Passing Parameters to Functions by Reference & pointers.

UNIT – IV

Static Polymorphism: Operators in C++, Precedence and Associativity Rules, Operator Overloading, Unary & Binary Operators Overloading, Function Overloading, Inline Functions, Merits/Demerits of Static Polymorphism .

TEXT BOOKS:

1. Herbert Schildt, C++, The Complete Reference, Tata McGraw-Hill
2. Robert Lafore, Object Oriented Programming in C++, SAMS Publishing

REFERENCE BOOKS:

1. Bjarne Stroustrup, The C++ Programming Language, Pearson Education
2. Balaguruswami, E., Object Oriented Programming In C++, Tata McGraw-Hill.

B.Sc Computer Science Semester IV

PAPER I I: Operating System

.....
Maximum Marks: 50

External: 40

Minimum Pass Marks: 18

Internal: 10

Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/ short -answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I

Introduction: operating system, architecture, functions, characteristics, historical evolution, types: Serial batch, multiprogramming, time sharing, real time, distributed and parallel. OS as resource Manager.

Computer system structures: I/O structure, storage structure, storage hierarchy.

Operating system structure: system components, services, system calls, system programs, system structures.

UNIT – II

Process management: process concepts, process state, process control block, operations, process scheduling, inter process communication.

CPU Scheduling: scheduling criteria, levels of scheduling, scheduling algorithms, multiple processor scheduling. Deadlocks: Characterization, methods of handling, deadlock detection, prevention, avoidance, recovery.

UNIT – III

Storage Management: memory management of single-user and multiuser operating system, partitioning, swapping, paging and segmentation, virtual memory, Page replacement Algorithms, Thrashing.

Process synchronization: critical section problems, semaphores. Mutual exclusion

UNIT – IV

Device and file management: Disk scheduling, Disk structure, Disk management, File

Systems: Functions of the system, File access and allocation methods, Directory Systems:

Structured Organizations, directory and file protection mechanisms.

TEXT BOOKS:

1. Silberschatz A., Galvin P.B., and Gagne G., "Operating System Concepts", John Wiley & Sons, Inc., New York.
2. Godbole, A.S., "Operating Systems", Tata McGraw-Hill Publishing Company, New Delhi.

REFERENCE BOOKS:

1. Deitel, H.M., "Operating Systems", Addison-Wesley Publishing Company, New York.
2. Tanenbaum, A.S., "Operating System- Design and Implementation", Prentice Hall of India, New Delhi.

B.Sc.-II(Physics)
Semester-III

Physics- PH-301

Paper V: Computer Programming and Thermodynamics

Max. Marks: 40

Internal Assessment: 10

Time: 3 Hours

Note:

1. The syllabus is divided into 4 units. 9 questions will be set.
2. Question no 1 will be compulsory, it contains 6 parts (from all the four units) and answer should be brief but not in yes / no.
3. Four more questions are to be attempted, selecting one question from each unit. Questions 2-9 may contain two or more parts. All questions carry equal marks
4. 20% numerical problems are to be set.
5. Use of scientific (non-programmable) calculator is allowed.

UNIT-1: Computer Programming

Computer organization, Binary representation, Algorithm development, Flow charts and their interpretation. FORTRAN Preliminaries: Integer and floating point arithmetic expression, built in functions, executable and non-executable statements, input and output statements, Formats, IF, DO and GO TO statements, Dimension arrays, statement function and function subprogram.

UNIT -2: Applications of FORTRAN programming

Algorithm, Flow Chart and Programming for Print out of natural numbers, Range of the set of given numbers, Ascending and descending order, Mean and standard deviation, Least square fitting of curve, Roots of quadratic equation, Product of two matrices, Numerical integration (Trapezoidal rule and Simpson 1/3 rule) .

UNIT-3: Thermodynamics-I

Thermodynamic system and Zeroth law of thermodynamics. First law of thermodynamics and its limitations, reversible and irreversible process. Second law of thermodynamics and its significance, Carnot theorem, Absolute scale of temperature, Absolute Zero and magnitude of each division on work scale and perfect gas scale, Joule's free expansion, , Joule Thomson effect, Joule-Thomson (Porous plug) experiment, conclusions and explanation, analytical treatment of Joule Thomson effect. Entropy, calculations of entropy of reversible and irreversible process , T-S diagram, entropy of a perfect gas, Nernst heat law(third law of thermodynamics), Liquefaction of gases, (oxygen, air, hydrogen and helium), Solidification of He below 4K, Cooling by adiabatic demagnetization.

UNIT-4: Thermodynamics-II

Derivation of Clausius-Clapeyron and Clausius latent heat equation and their significance, specific heat of saturated vapours, phase diagram and triple point of a substance, development of Maxwell thermodynamical relations. Thermodynamical functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them, derivation of Maxwell thermodynamical relations from thermodynamical functions, Application of Maxwell relations: relations between two specific heats of gas, Derivation of Clausius-Clapeyron and Clausius equation, variation of intrinsic energy with volume for (i) perfect gas (ii) Vanderwall gas (iii) solids and liquids , derivation of Stefans law, adiabatic compression and expansion of gas & deduction of theory of Joule Thomson effect.

References:

- 1 Ian C and Malcon C, Interactive FORTRAN 77, Affiliated East West Press Pvt Ltd, New Delhi
- 2 Rajaraman V, Computer Programming in FORTRAN 77, Prentice-Hall of India Pvt Ltd, New Delhi.
- 3 Suresh C, Computer Applications in Physics, Narosa Publishing House, New Delhi 4 Roy S K, Thermal Physics and Statistical Mechanics, New Age International Publishers, New Delhi
- 5 Sharma J K and Sarkar K K, Thermodynamics and Statistical Physics, Himalaya Publishing House, Bamba
- 6 Stowe Keith, Introduction to Thermodynamics and its Applications, University press (India) Pvt Ltd, Hyderabad
- 7 Infelta Pierre P. Introductory Thermodynamics Publisher: BrownWalker Press

- 8 Johnson J. K, Fundamentals of Thermodynamics University of Pittsburgh 2009
- 9 Jefferson Tester, Michael Modell, Thermodynamics and Its Applications 3rd Edition 10
Thomas Engel, Philip Reid, Thermodynamics, Statistical Thermodynamics, &
Kinetics 2nd Edition

Physics- PH-302

Paper VI: Wave and optics I

Max. Marks: 40

Internal Assessment: 10

Time: 3 hours

Note:

1. The syllabus is divided into 4 units. 9 questions will be set.
2. Question no 1 will be compulsory, it contains 6 parts (form all the four units) and answer should be brief but not in yes / no.
3. Four more questions are to be attempted, selecting one question from each unit. Questions 2-9 may contain two or more parts .All questions carry equal marks.
4. 20% numerical problems are to be set.
5. Use of scientific (non-programmable) calculator is allowed.

Unit-1: Interference I

Interference by Division of Wave front: Young's double slit experiment, Coherence, Conditions of interference, Fresnel's biprism and its applications to determine the wavelength of sodium light and thickness of a mica sheet, Lloyd's mirror, Difference between Bi-prism and Llyod mirror fringes, phase change on reflection.

Unit 2: Interference II

Interference by Division of Amplitude: Plane parallel thin film, production of colors in thin films, classification of fringes in films, Interference due to transmitted light and reflected light, wedge shaped film, Newton's rings, Interferometer: Michelson's interferometer and its applications to (i) Standardization of a meter (ii) determination of wavelength.

Unit- 3: Diffraction I

Fresnel's diffraction: Fresnel's assumptions and half period zones, rectilinear propagation of light, zone plate, diffraction at a straight edge, rectangular slit and circular aperture, diffraction due to a narrow slit and wire.

Unit -4: Diffraction II

Fraunhofer diffraction: single-slit diffraction, double-slit diffraction, N-slit diffraction, plane transmission grating spectrum, dispersive power of grating, limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating. Differences between prism and grating spectra.

References

- 1 Hecht, Optics, Pearson Education, New Delhi
- 2 Brooker G, Modern Classical Optics, Ane Books Pvt Ltd, New Delhi
- 3 Chaudhuri R N, Waves and Oscillations, New Age International Publishers, New Delhi 4
Khandelwal D P, Text Book of Optics and Atomic Physics, Himalaya Publishing
House, Bombay
- 5 Subrahmanyam N, Lal B, Avadhanulu M N, A Text Book of Optics, S Chand & Co, New Delhi
- 6 Barton A w, a text Book on Light, Longmans Green & Co London.
- 7 Longhurst R S, Geometrical and Physical Optics, University Press India Pvt.Ltd. Hyd.

Physics- PH-401

Paper VII: Statistical Physics

Max.Marks:40

Internal assessment:10

Time:3 Hours

Note:

1. The syllabus is divided into 4 units. 9 questions will be set.
2. Question no 1 will be compulsory, it contains 6 parts (from all the four units) and answer should be brief but not in yes / no.
3. Four more questions are to be attempted, selecting one question from each unit. Questions 2-9 may contain two or more parts. All questions carry equal marks.
4. 20% numerical problems are to be set.
5. Use of scientific (non-programmable) calculator is allowed.

Unit –I: Statistical Physics I

Microscopic and Macroscopic systems, events-mutually exclusive, dependent and independent. Probability, statistical probability, A- priori Probability and relation between them, probability theorems, some probability considerations, combinations possessing maximum probability, combination possessing minimum probability, Tossing of 2,3 and any number of Coins, Permutations and combinations, distributions of N (for $N= 2,3,4$) distinguishable and indistinguishable particles in two boxes of equal size, Micro and Macro states, Thermodynamical probability, Constraints and Accessible states, Statistical fluctuations, general distribution of distinguishable particles in compartments of different sizes, Condition of equilibrium between two systems in thermal contact-- β parameter, Entropy and Probability (Boltzman's relation).

Unit –II: Statistical Physics II

Postulates of statistical physics, Phase space, Division of Phase space into cells, three kinds of statistics, basic approach in three statistics. M. B. statistics applied to an ideal gas in equilibrium- energy distribution law (including evaluation of σ and β), speed distribution law & velocity distribution law. Expression for average speed, r.m.s. speed, average velocity, r. m. s. velocity, most probable energy & mean energy for Maxwellian distribution.

Unit-III: Quantum Statistics

Need for Quantum Statistics: Bose-Einstein energy distribution law, Application of B.E. statistics to Planck's radiation law B.E. gas, Degeneracy and B.E. Condensation, Fermi-Dirac energy distribution law, F.D. gas and Degeneracy, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law, Fermi Dirac gas and degeneracy, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law for electron gas in metals, Zero point energy, Zero point pressure and average speed (at 0 K) of electron gas, Specific heat anomaly of metals and its solution. M.B. distribution as a limiting case of B.E. and F.D. distributions, Comparison of three statistics.

Unit-IV: Theory of Specific Heat of Solids

Dulong and Petit law. Derivation of Dulong and Petit law from classical physics. Specific heat at low temperature, Einstein theory of specific heat, Criticism of Einstein theory, Debye model of specific heat of solids, success and shortcomings of Debye theory, comparison of Einstein and Debye theories.

References:

1. Prakash S and Agarwal J P, Statistical Mechanics, Kedar Nath Ram Nath & co, Meerur
2. Reiff. statistical Physics, Berleley Physics Course Volume 5, Mc Graw Hill Book Co Ltd, New Delhi
3. Mc Quarrie D A. Statistical Mechanics, Viva Books Pvt Ltd, New Delhi.
4. Ashley Cmter (August 1999), Classical and Statistical Thermodynamics .
5. Richard Fitzpatrick, Thermodynamics and Statistical Mechanics: An intermediate level course Lulu.com,2007

B.Sc.-II

Semester-IV

Physics-PH- 402

Paper VIII: Wave and Optics II

Max. Marks:40

Internal Assessment: 10

Time: 3 Hours

Note:

1. The syllabus is divided into 4 units. 9 questions will be set.
2. Question no 1 will be compulsory, it contains 6 parts (from all the four units) and answer should be brief but not in yes / no.
3. Four more questions are to be attempted, selecting one question from each unit. Questions 2-9 may contain two or more parts. All questions carry equal marks.
4. 20% numerical problems are to be set.
5. Use of scientific (non-programmable) calculator is allowed.

Unit-1: Polarization

Polarization: Polarisation by reflection, refraction and scattering, Malus Law, Phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and oblique incidence), Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light. Optical activity, Fresnel's theory of optical rotation, Specific rotation, Polarimeters (half shade and Biquartz).

Unit-II: Fourier analysis

Fourier theorem and Fourier series, evaluation of Fourier coefficient, importance and limitations of Fourier theorem, even and odd functions, Fourier series of functions $f(x)$ between (i) 0 to 2π , (ii) $-\pi$ to π , (iii) 0 to π , (iv) $-L$ to L , complex form of Fourier series, Application of Fourier theorem for analysis of complex waves: solution of

triangular and rectangular waves , half and full wave rectifier outputs, Parseval identity for Fourier Series, Fourier integrals.

Unit III: Fourier transforms

Fourier transforms and its properties, Application of Fourier transform (i) for evaluation of integrals, (ii) for solution of ordinary differential equations, (iii) to the following functions:

1. $f(x) = e^{-x^2/2}$

1 $|X| < a$

2 . $f(x) =$

0 $|X| > a$

Geometrical Optics I

Matrix methods in paraxial optics, effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses.

Unit-IV: Geometrical Optics II

Chromatic, spherical, coma, astigmatism and distortion aberrations and their remedies.

Fiber Optics

Optical fiber, Critical angle of propagation, Mode of Propagation, Acceptance angle, Fractional refractive index change, Numerical aperture, Types of optics fiber, Normalized frequency, Pulse dispersion, Attenuation, Applications, Fiber optic Communication, Advantages.

References

1 Born M and Wolf E, Principles of Optics, Pergaman Press

2 Jenkins and white, Fundamentals of Optics, McGraw Hill Book Co Ltd, New Delhi

3 Moller K D, Optics, University Science Books, Mill ally California

4 Tolansky, An Introduction to Interferometry, John Wiley & Sons, New Delhi

5 Shurcliff, Polarized Light Production and Use, Harward University Press, Cambridge,
M A (USA)

6 Arora C L, Refresher Course in Physics Vol II, S Chand and Co, New Delhi.

B.Sc Computer Science Semester III
PAPER II : SOFTWARE ENGINEERING

Maximum Marks: 50

External: 40

Minimum Pass Marks: 18

Internal: 10

Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/ short -answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I

Introduction: Program vs. Software, Software Engineering, Programming paradigms, Software Crisis – problem and causes, Phases in Software development: Requirement Analysis, Software Design, Coding, Testing, Maintenance, Software Development Process Models: Waterfall, Prototype, Evolutionary and Spiral models, Role of Metrics.

UNIT – II

Feasibility Study, Software Requirement Analysis and Specifications: SRS, Need for SRS, Characteristics of an SRS, Components of an SRS, Problem Analysis, Information gathering tools, Organising and structuring information, Requirement specification, validation and metrics.

UNIT – III

Structured Analysis and Tools: Data Flow Diagram, Data Dictionary, Decision table, Decision trees, Structured English, Entity-Relationship diagrams. Software Project Planning: Cost estimation: COCOMO model, Project scheduling, Staffing and personnel planning, team structure, Software configuration management, Quality assurance plans, Project monitoring plans, Risk Management.

Unit IV

Software testing strategies: unit testing, integration testing, V and V , System testing, Alpha and Beta testing. Black box, white box testing. Cyclomatic Complexity. Software Implementation and Maintenance: Type of maintenance , Management of Maintenance, Maintenance Process, maintenance characteristics.

TEXT BOOKS:

1. Pressman R. S., “Software Engineering – A Practitioner’s Approach”, Tata McGraw Hill.
2. Jalote P., “An Integrated approach to Software Engineering”, Narosa.

REFERENCE BOOKS:

1. Sommerville, “Software Engineering”, Pearson Education.
2. Fairley R., “Software Engineering Concepts”, Tata McGraw Hill.

B.Sc Computer Science Semester IV