



**RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY,
NAGPUR**

NOTIFICATION

No. Acad/140.

Date :4th June, 2014

To,

The Principal
of all the affiliated Science Colleges
of Rashtrasant Tukadoji Maharaj
Nagpur University, Nagpur

Subject:- Direction No. 4 of 2014.

Sir/Madam,

I am forwarding herewith a copy of the Direction No. 4 of 2014 issued by the Hon'ble Vice-Chancellor under Section 14(8) of Maharashtra Universities Act, 1994 **'Direction governing examination leading to the Degree Of Bachelor of Computer Application (Three Years Degree Course – Semester Pattern)'** and Examination Scheme to be implemented from Academic Session 2014-2015.

You are requested to kindly bring it to the notice of all teachers and students of your college.

Thanking you,

Yours faithfully,

Encl: As above.

Sd/-
(Dr. A.V. Gomashe)

Registrar,
Rashtrasant Tukadoji Maharaj
Nagpur University, Nagpur.

No. Acad/140

Nagpur dated the 4th June, 2014

Copy for information and necessary action along with the Direction and Scheme as mentioned above to :-

1. The Dean, Faculty of Science, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
2. The Chairman, Board of Studies in Computer Science, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur.
3. The Controller of Examinations, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
4. The Director, B.C.U.D., Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
5. The Deputy Registrar (Examinations) Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur.
6. The Deputy Registrar (Coll. Sec.) Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
7. The Asstt. Registrar (Prof. Exam.), Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
8. The Asstt. Registrar (Conf.), Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur.

9. The Asstt. Registrar (Exams & Enquiry.), Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
10. The Asstt. Registrar University's Sub-Centre at Gadchiroli, R.T.M. Nagpur University, Nagpur.
11. The Officer-in-Charge, Publication Section, R.T.M. Nagpur University, Nagpur.
12. The Asstt. Registrar, Ordinance Section, R.T.M. Nagpur University, Nagpur
13. The P. A. to the Hon'ble Vice-Chancellor, R.T.M. Nagpur University, Nagpur
14. The P. A. to the Hon'ble Pro-Vice-Chancellor, R.T.M. Nagpur University, Nagpur
15. The P. A. to the Registrar, R.T.M. Nagpur University, Nagpur
16. Mrs. Veena Prakashe, Information Scientist, R.T.M. Nagpur University, Nagpur

Sd/-

(Puran Meshram)

Deputy Registrar(Acad.)
Rashtrasant Tukadoji Maharaj
Nagpur University, Nagpur.

**RASHTRASANT TUKDOJI MAHARAJ
NAGPUR UNIVERSITY,
NAGPUR**

FACULTY OF SCIENCE

BOARD OF STUDIES IN COMPUTER SCIENCE

SYLLABUS FOR

B.C.A. Three Years (SIX SEMESTER) DEGREE COURSE

(FROM SESSION 2014-15)



RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FACULTY OF SCIENCE

DIRECTION NO. 4 OF 2014

**DIRECTION GOVERNING THE EXAMINATION LEADING TO
THE DEGREE OF BACHELOR OF COMPUTER APPLICATIONS**

(THREE YEARS DEGREE COURSE – SEMESTER PATTERN)

(Issued under Section 14(8) of the Maharashtra Universities Act,1994)

Whereas, Maharashtra Universities Act No. XXXV has come into force with effect from 22nd July, 1994 and further amended by Maharashtra Universities (Amendment and Continuance) Act, 2003, hereinafter referred as 'Act' has come into force from 8th August 2003.

AND

Whereas, the University Grants Commission, New Delhi vide letter No.D.O.No.F 1-2/2008/(XI Plan), dated.31 Jan.2008 regarding new initiatives under the XIth Plan – Academic Reforms in the University has suggested for improving quality of higher education and to initiate the Academic Reforms at the earliest.

AND

Whereas, the Board of Studies in all the Science subjects in their meeting held during 28.6.2013 prepared the syllabi and scheme of examination for the B.C.A. degree course and recommended for starting of the semester pattern in Faculty of Science from the academic session 2014-15,

AND

Whereas, the recommendations of various Board of Studies in the faculty of Science regarding Up-gradation and Revision of various syllabi and introduction and implementation of Semester Pattern Examination System at under graduate level was considered by the faculty of Science in its meeting held on 9.7.2013 and constituted a Committee to decide the policy decision regarding semester pattern examination system.

AND

Whereas, the Dean, Faculty of Science has consented to the syllabi and the scheme of examination for the award of B.C.A. degree in Faculty of Science,

AND

Whereas, the faculty of Science in its meeting held on 9.7.2013 vide item No. 35, has considered, accepted and recommended to Academic Council, the policy decision regarding introduction of Semester pattern and the draft syllabi of B.C.A. Semester-I & VI along with draft direction and other details.

AND

Whereas, the new scheme of examination as per semester pattern is to be implemented from the Academic Session 2014-15 for B.C.A. First Year & onwards which is to be regulated by this direction and as such there is no direction issued and in existence and framing of an Ordinance for the above examination is a time consuming process.

AND

Whereas, the admission of students in the semester pattern at B.C.A. First Year are to be made in the Academic Session 2014-15.

Now, therefore, I, Anoop Kumar, Vice Chancellor of Rashtrasant Tukadoji Maharaj Nagpur University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called, "**Examination leading to the Degree of Bachelor of Computer Applications (Three Year Degree Course-Semester Pattern)**".
2. This direction shall come into force with effect from the date of its issuance.
3. (i) The following shall be the examination leading to the Degree of Bachelor of Computer Applications in the faculty of Science namely:
 - a. The B.C.A. Semester-I Examination;
 - b. The B.C.A. Semester-II Examination;
 - c. The B.C.A. Semester-III Examination;
 - d. The B.C.A. Semester-IV Examination;
 - e. The B.C.A. Semester-V Examination; and
 - f. The B.C.A. Semester-VI Examination.(ii) The period of Academic Session shall be such, as may be notified by the University.
4. The theory examination of Semester-I, II, III, IV, V and VI shall be conducted by the University and shall be held separately at the end of each semester at such places and dates as may be decided by the University and shall be held as per the schedule given in Table 1.

Table 1			
Sr. No	Name of the Examination	Main Examination	Supplementary Examination
1	Semester I, III and V	Winter	Summer
2	Semester II, IV, and VI	Summer	Winter

5. Subject to compliance with the provisions of this Direction and of other Ordinances in force from time to time, the following persons shall be eligible for admission to the examinations:-

- (a) A student who has prosecuted a regular course of study for not less than one academic year prior to that examination;
- (b) A teacher in an Educational Institution eligible under the provisions of Ordinance No. 18, and
- (c) A women candidate who has not pursued a regular course of study.

Provided that in the case of the persons eligible under clauses (b) and (c), an applicant to the examination shall have attended a full course of laboratory instructions in a College in the subject in which laboratory work is prescribed. The candidate shall submit a Certificate to that effect signed by the Principal of the college.

6. Eligibility of every applicant for admission to B.C.A. Semester course shall:-

A) In case of the B.C.A. Semester I examination:-

The candidate should have passed the 12th Standard Examination of the Maharashtra State Board of Secondary and Higher Secondary Education with English and other Modern Indian Languages together with mathematics or an examination recognized as equivalent thereto in such subjects and with such standards of attainments as may be prescribed.

Provided that students passing the 12th Standard Examination of the Maharashtra State Board of Secondary and Higher Secondary Education and offering Vocational Stream with mathematics shall be eligible for admission to the B.C.A. Semester I course.

B) In case of the B.C.A. Semester II, III, IV, V and VI Examinations:- The student should have attended a minimum of 90 days in the respective semester and passed the previous semester examination as per the rules of ATKT as mentioned in Para 7 of this direction.

7) The ATKT rules for admission for the B.C.A. Course (**Theory and Practical as separate passing head and on calculation fraction, if any, shall be ignored**) shall be as given in the following Table- 2.

Table 2

Admission to Semester	The student should have attended the Session / term satisfactorily	Candidates should have passed at least one half of the passing heads of the following examinations (Theory and Practical as separate passing head and on calculation fraction, if any, shall be ignored)
1	2	3
B.C.A. Semester I	Semester I and admitted As per para 6 of this Direction	-----
B.C.A. Semester II	Semester II	-----
B.C.A. Semester III	Semester III	One half of the total head prescribed for Sem I and Sem II examination
B.C.A. Semester IV	Semester IV	-----
B.C.A. Semester V	Semester V	a) Passed Sem I & II examination and b) One half of the total head prescribed for Sem III & IV examination
B.C.A. Semester VI	Semester VI	-----

8. a) Without prejudice to the other provisions of Ordinance No. 6 relating to the Examinations in General, the provisions of Paragraph 5, 8, 10 and 31 of the said ordinance shall apply to every candidate.

b) The students admitted to this Degree course shall be governed by the general Ordinances / Directions of the University which are applicable to all the regular or ex-students. These Ordinances includes complete as well as relevant provision of Ordinance No. 1, 2, 6, 7-A, 9, 10, 19, 109, Ordinance No. 30 of 2006, (amended Ordinance No. 4 of 2006), Direction 9 of 2008, Direction 5 of 2004 wherever applicable accordingly AND

Direction / Ordinance of ATKT as well as reassessment / provisional admission as issued from time to time.

9. The fee for each Semester examination shall be as prescribed by the University from time to time.

10. Every examinee for the B.C.A. Semester I & II examination shall be examined in:

i) Compulsory English

ii) Any one of the following Languages

Marathi, Hindi, Urdu, Supplementary English, Gujarati, Bengali, Telugu, Sanskrit, French, German, Russian, Persian, Arabic, Pali and Prakrit or Latin

iii) six papers and three practicals at respective semester.

11. The Scope of the subjects of all semesters of B.C.A. examination shall be as indicated in the respective syllabi in force from time to time. The medium of instruction and examination shall be English, except for the courses in Languages.

12. The maximum marks allotted to each subject and the minimum marks which an examinee must obtain in order to pass the examination shall be as per the Appendix A appended to this Direction.

13. The practical examination of all semesters shall be conducted at the end of each semester as indicated in Table 3 given below.

Table 3

S. No	Name of the Examination	Main Examination	Supplementary Examination
1	Semester I, III and V	Winter	Summer
2	Semester II, IV, and VI	Summer	Winter

14. The scheme of awarding internal marks shall be as per Appendix- B appended with this Direction.

15. Successful examinees at the B.C.A. Sem-VI Examination who obtained not less than 60% marks (aggregate of Sem-I, II, III, IV, V & VI Examinations taken together, excluding Languages) shall be placed in First Division, those obtaining less than 60% but not less than 45% in Second Division, and all other successful examinees in the Third Division.

Explanation :

Division at the B.C.A. Examination shall be declared on the basis of the marks obtained only in the Subjects other than languages at the Sem-I, II, III, IV, V & VI Examinations taken together.

16. There shall be no classification of successful examinees at the Sem-I to Sem-V Examinations.

17. An examinee successful in the minimum period prescribed for the examination, obtaining not less than 75% of the maximum marks prescribed in the subject shall be declared to have passed the examination with Distinction in that subject.

Explanation :

- (1) Distinction shall be awarded only in the Science Subjects.
- (2) Distinction at the B.C.A. Examination shall be awarded on the basis of the marks obtained at the B.C.A. Semester - I, II, III, IV, V and Semester VI Examination taken together.
- (3) Distinction shall not be awarded to an examinee availing of the provision of the exemptions and compartments at any of the examination.

18. Provisions of Ordinance No 7-A relating to the Condonation of Deficiency of Marks for passing an examination and compartment as amended up-to-date vide ordinance No. 45 of 1983 shall apply to the examinations under this Direction.

19. As soon as possible after the examinations, the Board of Examinations shall publish a list of successful examinees at the B.C.A. Sem-I & II; B.C.A. Sem-III & IV and B.C.A. Sem-V & VI Examinations. Such list at the B.C.A. Semester VI Examination shall be arranged in three Divisions. The names of the examinees passing the examination as a whole in the minimum prescribed period and obtaining the prescribed number of places in First or Second Division shall be arranged in Order of Merit as provided in the Examinations in General Ordinance No. 6. While preparing the Merit list for the B.C.A. Examination the marks secured by the candidate in the compulsory languages at their Semester I & II Examination will be taken into consideration in addition to the marks scored by them in their optional subjects.

20. No Person shall be admitted to B.C.A. Sem-I, II, III, IV, V and VI Examinations, if he/she has already passed the corresponding or an equivalent examination of any other Statutory University.

21. Successful examinees at the B.C.A. Sem I, II, III, IV, and V Examinations shall be entitled to receive a **Certificate** signed by the **Registrar** and successful examinees at the end of B.C.A. Sem VI examination shall, on payment of prescribed fees, receive a Degree in the prescribed format, signed by the Vice-Chancellor.

22. The provisions of direction no. 3 of 2007 for the award of grace marks for passing an examination, securing higher grade in subject(s) as updated from time to time shall apply to the examination under this direction.

23. Absorption Scheme:

- a) While switching over to semester pattern, the failure students of annual pattern will be given three chances to clear the examination.
- b) The candidates who have cleared first year annual pattern examination in the subject shall get admission to third semester directly by matchable scheme. However, candidates who are allowed to keep term will not be eligible for admission to third semester unless they clear all the papers and practicals of first year annual pattern examination.
- c) The candidates who have cleared second year annual pattern examination in the subject shall get admission to fifth semester directly by matchable scheme.. However, candidates who are allowed to keep term will not be eligible for admission to fifth semester unless they clear all the papers and practicals of second year annual pattern examination.
- d) The unsuccessful students of old course (Yearly pattern) shall be permitted to appear for higher class as per the new course (Semester Pattern) examination of the Bachelor of Computer Applications programme (Semester Pattern) provided that they submit a certificate from the Head of the Department/Principal of the College stating that they have satisfactorily undergone a course of study in all the subjects of the new course.

- e) The absorption scheme of the Bachelor of Computer Applications programme (Semester Pattern) will be effective till the introduction of new syllabus with the new absorption scheme.
- f) For other Statutory University candidates with similar yearly pattern program point No. 23 'a', 'b' and 'c' shall be applicable.
- g) For other Statutory University candidates with Semester pattern Bachelor of Computer Applications program the Candidates shall be admitted to next higher semester provided that he/she shall have cleared previous semester and a R.T.M. Nagpur University Committee constituted from time to time for the purpose shall scrutinize and clear the case on the basis of subject and syllabus contents of his / her previous semester exam of the other Statutory University.

Nagpur

Date : 16.5.2014

**Sd/-
(Anoop Kumar)**

Vice-Chancellor

Appendix - B:

Guidelines for Internal Assessment, Theory paper pattern and Practical

1. Each semester shall comprise of minimum 90 teaching days.
2. Each semester will comprise
 - a. six theory papers – 50 Marks each
 - b. internal assessment for each paper - 10 Marks each.
 - c. three practicals –30 marks each
3. In addition to the above, Semester I and II will have
 - a. One compulsory English paper of 60 marks with 15 marks internal assessment, Total 75 marks.
 - b. One second language paper (Marathi, Hindi, Urdu, Supplementary English, Gujarati, Bengali, Telugu, Sanskrit, French, German, Russian, Persian, Arabic, Pali and Prakrit or Latin) of 60 Marks with 15 marks internal assessment, Total 75 marks.

Internal Assessment:

4. The internal assessment shall be done by the College at least 15 days prior to the final examination of each semester. The Marks shall be sent to the University immediately after the Assessment in the prescribed format.
5. Guidelines for Internal Assessment are appended herewith.
 - a) The internal assessment marks assigned to each theory paper as mentioned in Appendix - A shall be awarded on the basis of assignments like class test, attendance, project assignments, seminar, study tour, industrial visits, visit to educational institutions and research organizations, field work, group discussions or any other innovative practice / activity.
 - b) There shall be one / two assignments (as described above) per Theory paper.
 - c) There shall be no separate / extra allotment of work load to the teacher concerned. He/ She shall conduct the Internal assessment activity during the regular teaching days / periods as a part of regular teaching activity.
 - d) The concerned teacher / department / college shall have to keep the record of all the above activities until six months after the declaration of the results of that semester.
 - e) At the beginning of each semester, every teacher shall inform his / her students unambiguously the method he / she proposes to adopt and the scheme of marking for internal assessment.
 - f) Teacher shall announce the schedule of activity for internal assessment in advance in consultation with HOD / principal.
 - g) Final submission of internal marks to the University shall be before the commencement of the University Theory examinations.

Theory Papers:

6. All Theory papers shall be divided into four units.
7. The theory question papers shall be of 3 hours duration and comprise of 5 questions with equal weightage to all units.
8. The pattern of question papers is appended herewith.

Each theory paper will be of 50 marks each. All questions are compulsory and will carry equal marks.

Question paper for any theory paper will comprise of five questions of 10 marks each. Question No. 1 to 4 will be from four units each with an internal choice. The questions can be asked in the form of long answer type for 10 marks.

Question No. 5 shall be compulsory with three questions / notes of very short answer type from

each of the four units having 1 mark each. The student shall have an option of answering any 10 questions out of the 12 questions.

Practical:

9. Practical exam shall be of 4 hours duration.

10. The Practical Record of every student shall carry a certificate as shown below, duly signed by the teacher-in-charge and the Head of the Department.

11. If the student fails to submit his / her certified Practical Record duly signed by the Teacher-In-Charge and the Head of the Department, he / she shall not be allowed to appear for the Practical Examination and no Marks shall be allotted to the student.

12. The certificate template shall be as follows:

C E R T I F I C A T E

Name of the college / institution _____

Name of the Department: _____

This is to certify that this Practical Record contains the bonafide record of the Practical work of Shri / Kumari /

Shrimati _____ of _____

Semester _____

_____ during the academic year _____. The candidate has satisfactorily completed the experiments

prescribed by Rashtrasant Tukdoji Maharaj Nagpur University for the subject _____

Dated ___ / ___ / _____

Signature of the teacher who taught the examinee

1. _____

2. _____

Head of the Department

Appendix-A
Teaching & Examination Scheme
Bachelor of Computer Application (B.C.A.)
Three Year (SIX SEMESTER) DEGREE COURSE
B.C.A. Part I (Semester I)

Sr.No.	Papers	Title of Paper	Teaching Scheme			Examination Scheme								
			Th+Tu (Periods)	Pr (Periods)	Total periods	Theory				Practical			Total (Th,Pr,Al)	
			Duration Hours	Max Marks Th. Papers	Max. Marks IA	Total	Min Passing Marks	Duration Hours	Max Marks Practical	Min Passing Marks				
1.	-	English	4+1	-	4+1	3	60	15	75	30	-	-	-	75
2.	-	Marathi/Hindi/U rdu/Gujarati/ Sanskrit / Suppl. English	3	-	3	3	60	15	75	30	-	-	-	75
3.	Paper-I	Computer Fundamentals	3	-	3	3	50	10	60	24	-	-	-	60
4.	Paper-II	“C” Programming	3	-	3	3	50	10	60	24	-	-	-	60
5.	Paper-III	Statistical Methods	3	-	3	3	50	10	60	24	-	-	-	60
6.	Paper-IV	Discrete Mathematics – I	3	-	3	3	50	10	60	24	-	-	-	60
7.	Paper-V	Operating Systems	3	-	3	3	50	10	60	24	-	-	-	60
8.	Paper-VI	Office Automation	3	-	3	3	50	10	60	24	-	-	-	60
9.	Pactical-I	Practical I – based on paper I & paper II		6	6	-	-	-	-	-	4	30	12	30
10.	Pactical-II	Practical II – based on paper III & paper IV		6	6	-	-	-	-	-	4	30	12	30
11.	Pactical-III	Practical III – based on paper V & paper VI		6	6	-	-	-	-	-	4	30	12	30

Note:

1. Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately.

Grand Total of Semester I: 450 + 150 = TOTAL = 600 Marks.

- The strength of Batch of Practical and Tutorial for Under Graduates classes shall be 16 with an additional; of 10% with the permission of Hon'ble Vice-Chancellor.
- Details of Course of Languages shall be as per B.Sc. I

Teaching & Examination Scheme
Bachelor of Computer Application (B.C.A.)
Three Year (SIX SEMESTER) DEGREE COURSE
B.C.A. Part I (Semester II)

Sr.No.	Papers	Title of Paper	Teaching Scheme			Examination Scheme								
			Th+Tu (Periods)	Pr (Periods)	Total periods	Theory				Practical			Total (Th,Pr,AI)	
						Duration Hours	Max Marks Th. Papers	Max. Marks IA	Total	Min Passing Marks	Duration Hours	Max Marks Practical		Min Passing Marks
1.	-	English	4+1	-	4+1	3	60	15	75	30	-	-	-	75
2.	-	Marathi/Hindi/Urdu, Gujarati, Sanskrit / Suppl. English	3	-	3	3	60	15	75	30	-	-	-	75
3.	Paper-I	Programming In 'C++'	3	-	3	3	50	10	60	24	-	-	-	60
4.	Paper-II	System Analysis And Design	3	-	3	3	50	10	60	24	-	-	-	60
5.	Paper-III	Numerical Methods	3	-	3	3	50	10	60	24	-	-	-	60
6.	Paper-IV	Discrete Mathematics – II	3	-	3	3	50	10	60	24	-	-	-	60
7.	Paper-V	Linux Operating System	3	-	3	3	50	10	60	24	-	-	-	60
8.	Paper-VI	E Commerce	3	-	3	3	50	10	60	24	-	-	-	60
9.	Pactical-I	Practical I – based on paper I & paper II		6	6	-	-	-	-	-	4	30	12	30
10.	Pactical-II	Practical II – based on paper III & paper IV		6	6	-	-	-	-	-	4	30	12	30
11.	Pactical-III	Practical III – based on paper V & paper VI		6	6	-	-	-	-	-	4	30	12	30

Note:

1. Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately.

Grand Total of Semester II : 450 + 150 = TOTAL = 600 Marks.

- The strength of Batch of Practical and Tutorial for Under Graduates classes shall be 16 with an additional; of 10% with the permission of Hon'ble Vice-Chancellor.
- Details of Course of Languages shall be as per B.Sc. I

Teaching & Examination Scheme
Bachelor of Computer Application (B.C.A.)
Three Year (SIX SEMESTER) DEGREE COURSE
B.C.A. Part II (Semester III)

Sr.No.	Papers	Title of Paper	Teaching Scheme			Examination Scheme								
			Th+Tu (Periods)	Pr (Periods)	Total periods	Theory				Practical			Total (Th,Pr,Al)	
Duration Hours	Max Marks Th. Papers	Max. Marks IA				Total	Min Passing Marks	Duration Hours	Max Marks Practical	Min Passing Marks				
1.	Paper-I	Visual Basic Programming	3	-	3	3	50	10	60	24	-	-	-	60
2.	Paper-II	Data Base Management System	3	-	3	3	50	10	60	24	-	-	-	60
3.	Paper-III	Data Structures	3	-	3	3	50	10	60	24	-	-	-	60
4.	Paper-IV	Operations Research – I	3	-	3	3	50	10	60	24	-	-	-	60
5.	Paper-V	Web Technology - I	3	-	3	3	50	10	60	24	-	-	-	60
6.	Paper-VI	Digital Electronics – I	3	-	3	3	50	10	60	24	-	-	-	60
7.	Pactical-I	Practical I – based on paper I & paper II		6	6	-	-	-	-	-	4	30	12	30
8.	Pactical-II	Practical II – based on paper III & paper IV		6	6	-	-	-	-	-	4	30	12	30
9.	Pactical-III	Practical III – based on paper V & paper VI		6	6	-	-	-	-	-	4	30	12	30

Note:

1. Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately.

Grand Total of Semester III: 450

- The strength of Batch of Practical and Tutorial for Under Graduates classes shall be 16 with an additional; of 10% with the permission of Hon'ble Vice-Chancellor.

Teaching & Examination Scheme
Bachelor of Computer Application (B.C.A.)
Three Year (SIX SEMESTER) DEGREE COURSE
B.C.A. Part II (Semester IV)

Sr.No.	Papers	Title of Paper	Teaching Scheme			Examination Scheme								
			Th+Tu (Periods)	Pr (Periods)	Total periods	Theory					Practical			Total (Th,Pr,AI)
						Duration Hours	Max Marks Th. Papers	Max. Marks IA	Total	Min Passing Marks	Duration Hours	Max Marks Practical	Min Passing Marks	
1.	Paper-I	Software Engineering-I	3	-	3	3	50	10	60	24	-	-	-	60
2.	Paper-II	Sql And Pl/Sql	3	-	3	3	50	10	60	24	-	-	-	60
3.	Paper-III	Theory Of Computation	3	-	3	3	50	10	60	24	-	-	-	60
4.	Paper-IV	Operations Research - II	3	-	3	3	50	10	60	24	-	-	-	60
5.	Paper-V	Web Technology - II	3	-	3	3	50	10	60	24	-	-	-	60
6.	Paper-VI	Digital Electronics – II	3	-	3	3	50	10	60	24	-	-	-	60
7.	Pactical-I	Practical I – based on paper I & paper II		6	6	-	-	-	-	-	4	30	12	30
8.	Pactical-II	Practical II – based on paper III & paper IV		6	6	-	-	-	-	-	4	30	12	30
9.	Pactical-III	Practical III – based on paper V & paper VI		6	6	-	-	-	-	-	4	30	12	30

Note:

1. Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately.

Grand Total of Semester IV: 450

- The strength of Batch of Practical and Tutorial for Under Graduates classes shall be 16 with an additional; of 10% with the permission of Hon'ble Vice-Chancellor.

Teaching & Examination Scheme
Bachelor of Computer Application (B.C.A.)
Three Year (SIX SEMESTER) DEGREE COURSE
B.C.A. Final (Semester V)

Sr.No.	Papers	Title of Paper	Teaching Scheme			Examination Scheme								
			Th+Tu (Periods)	Pr (Periods)	Total periods	Theory					Practical			Total (Th,Pr,AI)
						Duration Hours	Max Marks Th. Papers	Max. Marks IA	Total	Min Passing Marks	Duration Hours	Max Marks Practical	Min Passing Marks	
1.	Paper-I	Computer Graphics - I	3	-	3	3	50	10	60	24	-	-	-	60
2.	Paper-II	Compiler Construction	3	-	3	3	50	10	60	24	-	-	-	60
3.	Paper-III	VB.Net	3	-	3	3	50	10	60	24	-	-	-	60
4.	Paper-IV	Software Engineering - II	3	-	3	3	50	10	60	24	-	-	-	60
5.	Paper-V	PHP - I	3	-	3	3	50	10	60	24	-	-	-	60
6.	Paper-VI	Data Communication And Network - I	3	-	3	3	50	10	60	24	-	-	-	60
7.	Pactical-I	Practical I – based on paper I & paper II		6	6	-	-	-	-	-	4	30	12	30
8.	Pactical-II	Practical II – based on paper III & paper IV		6	6	-	-	-	-	-	4	30	12	30
9.	Pactical-III	Practical III – based on paper V & paper VI		6	6	-	-	-	-	-	4	30	12	30

Note:

1. Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately.

Grand Total of Semester V: 450

- The strength of Batch of Practical and Tutorial for Under Graduates classes shall be 16 with an additional; of 10% with the permission of Hon'ble Vice-Chancellor.

Teaching & Examination Scheme
Bachelor of Computer Application (B.C.A.)
Three Year (SIX SEMESTER) DEGREE COURSE
B.C.A. Final (Semester VI)

Sr.No.	Papers	Title of Paper	Teaching Scheme			Examination Scheme								
			Th+Tu (Periods)	Pr (Periods)	Total periods	Theory					Practical			Total (Th,Pr,AI)
						Duration Hours	Max Marks Th. Papers	Max. Marks IA	Total	Min Passing Marks	Duration Hours	Max Marks Practical	Min Passing Marks	
1.	Paper-I	Computer Graphics - II	3	-	3	3	50	10	60	24	-	-	-	60
2.	Paper-II	Programming In Java	3	-	3	3	50	10	60	24	-	-	-	60
3.	Paper-III	ASP.Net	3	-	3	3	50	10	60	24	-	-	-	60
4.	Paper-IV	Software Testing	3	-	3	3	50	10	60	24	-	-	-	60
5.	Paper-V	PHP - II	3	-	3	3	50	10	60	24	-	-	-	60
6.	Paper-VI	Data Communication And Network - II	3	-	3	3	50	10	60	24	-	-	-	60
7.	Pactical-I	Practical I – based on paper I & paper II		6	6	-	-	-	-	-	4	30	12	30
8.	Pactical-II	Practical II – based on paper III & paper IV		6	6	-	-	-	-	-	4	30	12	30
9.	Pactical-III	Practical III – based on paper V & paper VI		6	6	-	-	-	-	-	4	30	12	30

Note:

1. Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment.
2. Minimum marks for passing will be 40% of the total marks allotted to that paper / practical.
3. Candidate has to pass theory papers and practical separately.

Grand Total of Semester VI: 450.

- The strength of Batch of Practical and Tutorial for Under Graduates classes shall be 16 with an additional; of 10% with the permission of Hon'ble Vice-Chancellor.

Valuation Pattern for practical examination:-

The valuation scheme of practical examination will be as under.

Record

Viva	- 6
Writing	- 09
Execution	- 09
TOTAL	- 30

B.C.A. Part I Semester I (From 2014-2015)

B.C.A. Part I Semester I

Paper I

COMPUTER FUNDAMENTALS

UNIT - I :

Basic Components of Digital Computers: Block Diagram. **CPU:** Functions of Each Unit: Primary Memory, ALU and CU, Instruction format. **Bus:** Data, Control and Address Bus **Number Systems:** Binary, Octal, Decimal, HexaDecimal, Their Conversions, Binary Arithmetic. ASCII, BCD, EBCDIC.

Language Evolution : Generation of Languages : Machine, Assembly, High Level Languages. Characteristics of Good Language **Translators :** Compiler, Interpreter and Assembler. Source and Object Program.

UNIT - II :

Memory: Static & dynamic, RAM, ROM, PROM, EPROM, EEPROM, flash and Cache.

Storage Devices: Hard Disk, Zip Disk and Optical Disk. Pen Drive, Blue Ray

UNIT - III :

Input Devices: Keyboard, Mouse, Light Pen, Touch Screen, Voice Input , MICR, OCR, OMR, Barcode Reader and Flatbed Scanner.

Output Devices: VDU, Printers: Dot Matrix, Laser and Inkjet.

Plotters: Drum, Flat-Bed and Inkjet.

UNIT - IV :

Network: Network terminology, Topologies : Linear, Circular, Tree and Mesh. Types of Networks: LAN, WAN, MAN. Repeaters, Bridge, Routers, Brouters and Gateway. Modem for Communication between pc's, wi-fi network, Introduction of Bluetooth and Infrared devices. Network protocols. Architecture : Peer-to-Peer, Client/Server.

Reference Books:

1. Information technology concepts by Dr. Madhulika Jain, Shashank & Satish Jain, [BPB Publication, New Delhi.]

2. Fundamentals of Information Technology By Alexis And Mathews Leon [Leon Press, Chennai & Vikas Publishing House Pvt Ltd, New Delhi]

B.C.A. Part I Semester I
Paper II
‘C’ PROGRAMMING

UNIT- I :

Programming Structure : Sequence, Selection, Iteration and Modular. **Problem Solving techniques:** Development Tools: Algorithm, Flowcharts and Pseudo code (Definition and its characteristics) **Developing Algorithm and Drawing flowcharts**

UNIT- II :

C Character set, Tokens, Identifier, Keywords, Variables, Data types, Qualifiers. Operators and Expressions: Arithmetic, Relational, Logical, Bit-Wise, Increment, Decrement, Conditional and Special operators. typedef, Type Conversion, Constants, Declaring Symbolic Constants, Character Strings, Enumerated Data Types, Operator Precedence and Associativity. Library functions. : Maths, string handling Functions. Control Structure: Compound Statement, Selection Statement: if, if-else, Nested if, switch. Iteration statement: for, while, do..while, Nested loops, Jump statement: break, continue, goto. (Special emphasis on problem solving)

UNIT- III :

Arrays: Need, Types: Single and Two Dimensional Array.

Strings: Strings Manipulation, Arrays of Strings, Evaluation order

Function: Function Components, Return Data type, Parameter Passing, Return by Reference, Default Arguments, Recursive Functions, Arrays with Functions, Storage Classes. (Special emphasis on problem Solving)

UNIT- IV:

Structure: Declaration, Definition, Accessing structure members, Initialization, Nesting of Structures.

Union: Unions, Differences between Structure and Union

Pointer: Introduction, Address Operator (&), Pointer variables, Void pointers, Pointer Arithmetic, Pointers to Pointers.

File handling: Hierarchy of File Stream Classes, Opening & closing a file, Testing for errors, File Modes, File pointers and their manipulations, Sequential Access, Random Access, Command Line arguments.

Reference Books:

1. The Art of programming through flowcharts & algorithm by Anil B. Chaudhari Firewall Media, Laxmi publication, New Publication.
2. Programming in C by E. Balagurusamy TMH Publications.
3. C Programming - Kernighen Ritche
4. Programming with C – Y. Kanetkar.
5. C Programming – Holzner, PHI Publication.
6. Programming in C – Ravichandran.

B.C.A. Part I Semester I
Paper III
STATISTICAL METHODS

UNIT- I:

Introduction - Definition of Statistics, Importance and scope of Statistics, Limitations of statistics, Distrust of Statistics. Statistical Data Collection - Primary and Secondary data, Methods of Collecting Primary data, Sources and Secondary Data, Census and Sample Investigation. Presentation of statistical Data - Classification, Tabulation, Frequency Distribution, Diagrams and Graphs. Frequency Distributions and

UNIT- II :

Measures of Central Tendency - Frequency Distribution, Continuous Frequency Distribution, Graphic Representation of a Frequency Distribution Average or Measures of Central Tendency or Measures of Locations, Requisites for an ideal Measure of Central Tendency Arithmetic: Mean Median, Mode, Geometric Mean and Harmonic Mean, Weighted Average, Relationship amongst different Averages.

UNIT- III:

Measures of Dispersion, Skewness and Kurtosis - Meaning and Significance of Dispersion, Methods of Measuring Dispersion - Range, Quartile, Mean Deviation, Standard Deviation, Coefficient of Skewness, Kurtosis, Coefficient of Dispersion, Coefficient of Variation.

UNIT- IV:

Correlation and Regression - Definition of Correlation, . Scatter Diagram, Karl Pearson Coefficient of Correlation, Limits for Correlation Coefficient, Definition of Regression, Lines of Regression, Regression Curves, Regression coefficients, properties of Regression coefficients, Correlation Analysis vs. Regression Analysis.

Reference Books:

- 1.S Sastry Introduction to Numerical Analysis
- 2.Y. Rajaraman, Computer Oriented Numerical Methods - Prentice Hall Publication
- 3.Gupta and Kapoor Fundamental of Mathematical Statistics
- 4.Brian Flowers Introduction to Numerical Methods in C++ By. (Oxford)
- 5.E. Balaguruswamy, Numerical Methods - Tata McGraw Hill Publication
- 6.Srimanta Pal Numerical Methods (Oxford)
- 7.K Sankara Rao Numerical Methods for Scientists & Engineers [PIII].
- 8.Manish Goyal Computer Based Numerical And Statistical Techniques (Laxmi)

B.C.A. Part I Semester I
Paper IV
DISCRETE MATHEMATICS – I

UNIT- I:

Propositional Calculus:

Connectives, Negation, conjunction, Disjunction, statement formulas and truth tables, conditional and Bi-conditional, well formed formulas, Tautologies, Equivalence of formulas, duality law, Tautologies implications, Functionally complete set of, other connectives,

UNIT- II:

Disjunctive normal forms, connective normal forms, Principal disjunctive normal form, Principal conjunctive normal form.

UNIT- III:

Predicate Calculus:

The theory of Inference for statement Calculus, validity using truth tables, Rules of inference, consistency of premises and indirect method of Proof

UNIT- IV:

The statement function, variables and quantifier, Predicate formulas, Free and Bound variables, The universe of Discourse, Theory of inference for predicate calculus.

Reference Books:

1. Discrete Mathematical Structures with applications to computer Science By J.P.Tremblay & R. Manohar, (TMH)
2. Discrete Mathematical Structures by Kolman Busby and Ross (pearson)
3. Discrete Mathematics By Norman Biggs. (Oxford).
4. Logic and Discrete Mathematics : Grassmann, Tremblay (Pearson)
5. Introduction to Automata Theory, Languages, and computation :Hopcroft, Motwani and Ullman(Pearson)
6. An introduction to the theory of computer science , languages and machines : Sudkamp
7. Kenneth H Rosen Discrete Mathematics & it's Applications TMH

B.C.A. Part I Semester I
Paper V
OPERATING SYSTEMS

UNIT - I:

Structure of Operating System, Operating System functions, Characteristics of Modern OS. **Process Management:** Process states, Creation, Termination, Operations on Process, Concurrent process, Processes Threads, Multithreading, Micro Kernels
CPU Scheduling: Schedulers, Scheduling Methodology, CPU Scheduling Algorithm: FCFS, SJF, RR, Priority Scheduling.

UNIT – II:

Performance comparison : Deterministic Modeling , Queuing analysis, Simulators.
Deadlock and Starvation: Resource Allocation Graph, Conditions for Dead Lock, Dead Lock Prevention, Dead Lock Detection, Recovery from Deadlock.

UNIT - III:

Memory Management: Logical Vs. Physical Address Space, Swapping, Memory Management Requirement, Dynamic Loading and Dynamic Linking, Memory Allocation Method: Single Partition allocation, Multiple Partitions, Compaction, paging, segmentation, Segmentation with paging. Protection.

UNIT - IV:

I/O Management: I/O hardware, I/O Buffering, Disk I/O, Raid, Disk Cache. **File Management:** File Management system, File Accessing Methods, File Directories, File Allocation Methods, File Space Management, Disk Space Management, Record blocking. **Protection Mechanisms:** Cryptography, Digital Signature, User Authentication.

Reference Books:

1. Operating Systems by P. Balakrishna Prasad [Scitech Publication]
2. Operating System Concept : Silbershaz (Addision Education)
3. Operating Systems - H.M. Deitel - Addision Wesley.
4. Operating Systems- John J. Donoven.
5. Operating System : A.S.Godbole (TMH)
6. Modern Operating Systems : Tenenenbaum (Pearson Education)
7. Operating System : Peterson.

B.C.A. Part I Semester I
Paper VI
OFFICE AUTOMATION

UNIT – I

Introduction to windows Operating System

Advantages of windows operating system, using different windows applications simultaneously, operating with windows, GUI, use of help features, starting an application, essential accessories, creating shortcuts, windows explorer, control panel, my computer, my documents, recycle bin, finding folders and files, changing system settings, system tools, use of run command, setting peripherals, drivers, editing graphics in windows, new features in windows XP/Vista versions.

UNIT - 2

Introduction, basics, starting Word, creating document, parts of Word window, mouse and keyboard operations, designing a document; Formatting- selection, cut, copy, paste; Toolbars, operating on text; Printing, saving, opening, closing of document; Creating a template; Tables, borders, pictures, text box operations; Mail Merge.

UNIT - 3

Introduction to MS EXCEL, navigating, Excel toolbars and operations, Formatting; copying data between worksheets; entering formula, chart creation; data forms, data sort; Functions in Excel ROUND(), SQRT(), MAX(), MIN(), AVERAGE(), COUNT(), SUMIF(), SUMIF(), ABS(), ROMAN(), UPPER(), LOWER(), CELL(), TODAY(), NOW().

UNIT – 4

Introduction to MS POWER POINT Working with Power Point Window, Standard Tool Bar, Formatting tool bar, Drawing tool Bar, Moving the Frame, Inserting Clip Art, Picture, Slide, Text Styling, Send to back, Entering data to graph, Organization Chart, Table, Design template, Master Slide, Animation Setting, Saving and Presentation , auto Content Wizard.

Reference Books:

1. MS Office XP for Everyone By Sanjay Saxena (Vikas Publi, Noida)
2. MS-Office 2000(for Windows) By Steve Sagman
3. A First Course in Computers – Sanjay Saxena

B.C.A. Part I Semester II
Paper I
PROGRAMMING IN 'C++'

UNIT - I :

Object Oriented Methodology:

Elements of Object Oriented programming, Objects, Classes, OOPs features.

Classes & Objects: Specifying a Class, Creating Objects, Accessing Class members, Defining member function, Outside Member Functions as inline, Accessing Member Functions within the class, Static data member, Access Specifiers: Private, Protected and Public Members.

UNIT - II :

CONSTRUCTORS & DESTRUCTORS: Introduction, Parameterized Constructors, Constructor Overloading, Constructors with Default Arguments, Copy Constructor, Destructor, Order of Construction and Destruction, Static data members with Constructor and Destructors.

OPERATOR OVERLOADING: Definition, Overloadable Operators, Unary Operator Overloading, Unary & Binary overloading, Rules for Operators Overloading.

UNIT - III :

DYNAMIC OBJECTS: Pointers to Objects, Creating and Deleting Dynamic Objects: New and Delete operators, Array of Objects, Array of Pointers to Objects, Pointers to Object Members, this Pointer.

INHERITANCE: Defining, Abstract classes, Single, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Constructor and Destructor in Derived Classes.

UNIT - IV :

VIRTUAL FUNCTIONS: Need for Virtual Functions, definition, Pure Virtual Functions, Abstract Classes, Rules for Virtual Functions.

EXCEPTION HANDLING: Exception Handling Model, List of Exceptions, Handling Uncaught Exceptions, Fault Tolerant Design Techniques, Memory Allocation Failure Exception, Rules for Handling Exception Successfully.

Reference Books:

1. Mastering C++ by K R Venugopal Tata McGraw-Hill , New Delhi.
2. The C++ Programming Language –Bjarne Stroustrup
3. Programming with C++ - Ravichandran
4. Programming with C++ - Robert Lafore
5. Object Oriented Programming with C++ by E. Balagurusamy, McGraw Hill

B.C.A. Part I Semester II
Paper II
SYSTEM ANALYSIS AND DESIGN

UNIT - I :

Introduction : System, Subsystems, Components of Computerized Information System, Systems Analysts, SDLC, Prototyping.

Feasibility Study and Analysis: Identifying Problems, Organizing Feasibility Analysis: Economic, Financial, Organizational and Technological. Feasibility Decision, Choice of a solution.

Data Collection: Interviews, Brain Storming, Questionnaires, Document Search, Observation.

UNIT - II :

Structured tools and techniques of Data analysis : Structured English, Process Charts, SOP, Decision Tables and Decision Trees, Data Flow Diagram, Data Dictionary.

(Special emphasis on problem solving)

System Design : Input design: Input Validation, Human factor Consideration, Messages, System Tolerance. Output design: Categories of output, Design Principles, Control of Output. Forms: Principles of Form Design, Ways to ensure Quality Forms.

Codes: Types, Physical Representation of Codes, Principle of Code Design.

UNIT - III :

Implementation: Training, Operational Training and Related Activities, Planning to Implement Change, Change Strategies.

Testing: Preparation for Testing, Test Execution: Levels of Testing, Component, Function, Subsystem, System, Test Evaluation, Acceptance.

Conversion: Cold Turkey, Parallel, Pilot, Modular and Sequential Methods. Conversion Period Length. **System Evaluation.**

UNIT - IV :

Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques,

Scheduling: Work Breakdown Structure, Activity Networks and CPM, Gantt Charts, PERT Charts, Project Monitoring and Control. Risk Management, Software Configuration Management: Necessity, Configuring Management Activities

Software Reliability and Quality Management: Software Reliability, Software Quality, ISO 9000. Software Maintenance: Characteristics of Software Maintenance, Maintenance Process Models, Estimation of Maintenance Cost.

Software Reuse: What can be reused, Why no reuse so far, Basic Issues.

Reference Books:

1. Information Systems Analysis, Design and Implementation By K. M. Hussain
Donna Hussain [Tata McGraw-Hill Publishing Company Ltd, New Delhi]
2. Fundamentals of Software Engineering by Rajib Mall [PHI Publication]
3. Workbook on Systems Analysis & Design by V. Garg [PHI Publication]
4. System Analysis and Design- Don Yeates, shiebls, Helmy (M).
5. System Analysis & Design - Edward –TMH
6. System Analysis and Design – Satzinger, Robert Jackson and Stephen Burd,
Thomson Learning
7. Introduction to Systems Analysis Design, Igor Hawryszkiewicz, PHI

B.C.A. Part I Semester II
Paper III
NUMERICAL METHODS

UNIT - I :

Roots of Non-Linear Equations : Algebraic equation, Polynomial equation, Transcendental equation, Iterative method, Starting & Stopping Iterative method, Bisection Method, False Position method, Newton Raphson Method: Secant Method, Determining all possible roots, Multiple roots of polynomial, Complex Roots using Muller's Method.

UNIT - II :

Solution to Linear Equations Existence of solution, Gauss Elimination Method, Gauss elimination with pivoting, Gauss Jordan Method, Round off errors and refinement, m Conditioned system, Matrix inversion method.

UNIT - III :

Linear interpolation, Lagrange Interpolation, Spline Interpolation, Interpolation with equidistant points, Least Square regression Fitting, Transcendental equations, Multiple linear regression, m conditioning in Least square

UNIT - IV :

Integration & Differentiation : Trapezoidal Rule, Simpson 1/3 Rule, Simpson 3/8 rule, Gaussian Integration, Solution to differential equation (using Runge-Kutta second and fourth order methods, Multistep method for differential equations (Milne-Simpson method, Adams-bashforth-

Reference Books:

- 1.S Sastry Introduction to Numerical Analysis
- 2.Y. Rajaraman, Computer Oriented Numerical Methods - Prentice Hall Publication
- 3.Gupta and Kapoor Fundamental of Mathematical Statistics
- 4.Brian Flowers Introduction to Numerical Methods in C++ By. (Oxford)
- 5.E. Balaguruswamy, Numerical Methods - Tata McGraw Hill Publication
- 6.Srimanta Pal Numerical Methods (Oxford)
- 7.K Sankara Rao Numerical Methods for Scientists & Engineers [PIII].
- 8.Manish Goyal Computer Based Numerical And Statistical Techniques (Laxmi)

B.C.A. Part I Semester II
Paper IV
DISCRETE MATHEMATICS – 2

UNIT - I :

Set Theory:

Set, Subsets operations on set, Venn diagram, algebra on sets, Cartesian product of sets, Binary relations, Properties of binary relation, Relation matrix and the graph of relation, Partial order relations, Equivalence relations, Equivalence Classes, Composition of relations.

UNIT - II :

Functions - definition, types of function, Invertible functions composition of functions.

Counting - Permutation, Combinations, The pigeonhole principle, recurrence relation, Mathematical Induction.

UNIT - III :

Algebraic Structures

Semi groups & groups: Binary operations, Semi groups, isomorphism and Homomorphism, Product and Quotient of semi groups, Groups, subgroups, products and Quotient of groups.

Lattices: - Lattice concepts, isomorphic Lattices, Properties of lattices, Finite Boolean algebras.

UNIT - IV :

Graph Theory: Basic concepts, types of graphs, Representation of graph in memory, Euler path and circuits, Hamiltonian Path and circuits.

Trees:- Basic concepts, Libeled trees, Undirected trees.

Reference Books:

1. Discrete Mathematical Structures with applications to computer Science By J.P.Tremblay & R. Manohar, (TMH)
2. Discrete Mathematical Structures by Kolman Busby and Ross (pearson)
3. Discrete Mathematics By Norman Biggs. (Oxford).
4. Logic and Discrete Mathematics : Grassmann, Tremblay (Pearson)
5. Introduction to Automata Theory, Languages, and computation :Hopcroft, Motwani and Ullman(Pearson)
6. An introduction to the theory of computer science , languages and machines : Sudkamp
7. Kenneth H Rosen Discrete Mathematics & it's Applications TMH

B.C.A. Part I Semester II
Paper V
LINUX OPERATING SYSTEM

UNIT - I :

Logging In and Logging Out, Anatomy of Linux OS, Directory Structure, /usr Directory, File Types: User datafiles, System data files, Executable files. Naming files and directories, Spawning Processes. **Shell:** Creating User Account, Shell Program, bash shell, Changing shell prompt. **Commands:** Basic Syntax for a command, Exploring the Home Directory, ls, mkdir, rmdir, stat, cat, rm, mv, cp

UNIT - II :

Editor: Vi editor. **Hooking up Hardware Devices:** Formatting a Floppy Disk, Gathering important system information. Backing Up and restoring the File **System:** Simple Backup, gzip, gunzip, tar. **Printing files:** Print Spool directory, Sending files to Printer.

UNIT - III :

Sharing Files with other Users: Maintaining User Accounts, Changing Password, Creating Group Accounts, Granting Access to files, Changing File Ownership, Protecting Files, Making a File Read-Only. Working with Processes: Types of processes, ps Command, Creating process, killing process, free command and top utility.

UNIT - IV :

Managing Disk Space: df, du commands, Creating Additional Free Disk Space, Locating Unused Files, Setting System Clock. Communication Utilities: who, who am i, finger, mesg, write, wall, talk, Creating a message of the day. X Window System, Graphical User Interfaces: KDE and GNOME Desktop Environment.

Reference Books:

1. SAMS Teach Yourself Linux by Craig and Coletta Witherspoon [Techmedia]
2. LINUX complete reference by Richard Peterson

B.C.A. Part I Semester II
Paper VI
E COMMERCE

UNIT - I :

Introduction to e-Commerce, Scope of electronic commerce, definition, e-Commerce and Trade Cycle, e- Markets, Internet e-Commerce in perspective. Value chain, Supply chain, Porters value chain model, Inter organizational value chains.

UNIT - II :

Business strategy in electronic age: Competitive advantages, Strategy, Porters model, First Movers advantages, Advantages using e-Commerce. Introduction to business strategy, Strategic implications of IT, Technology, Business environment, Business capability, Existing business strategy, Strategy formulation and implementation planning, e-Commerce implementation, e-Commerce evaluation.

UNIT - III :

Business to Business e-Commerce: Inter organizational transactions, The credit transaction trade cycle, A variety of transaction, Pens and things, Electronics Market, Usage of e-Market, Advantages and disadvantages of e-Market, Future of e-Market, EDI, introduction, EDI and Business.

UNIT - IV :

Business to Consumer Electronic Commerce: Consumer trade transaction, Internet e-Commerce, e-Shop, Other e-Commerce technologies, Advantages and disadvantages of consumer e-Commerce. Elements of e-Commerce: elements, e-Visibility, e-Shop, Online payments, Internet e-Commerce security.

Reference Books:

01. E-Commerce, Strategy, Technologies and Applications By: David Whiteley Tata McGraw-Hill Edition.

B.C.A. Part II Semester III
Paper I
VISUAL BASIC PROGRAMMING

UNIT-I :

Working with Visual Basic Window Components: Menu Bar, Tool Bar, Project Explorer Window, Form Layout Window, properties Window, Toolbox, Code Editor Window **Working with Forms:** Properties, Events, Methods Working with Basic Controls: Label, CommandButton, TextBox, OptionButton, Frame, CheckBox, ListBox, ComboBox, Image, Scroll, Picture, Timer, DriveListBox, DirListBox, FileListBox and Shape Controls. **Basic Programming Fundamentals:** Variables, Data types, Constant, Conversion Function. Scope of Variable: Public, Private Static. Operators: Logical, Arithmetic, Concatenation, Comparison. Decision Structure: If.. Then, If..Then..Else, Select Case.. End Case. Loop Structure: Do..While, While.. Wend, For.. Next, With..EndWith. DoEvents()

UNIT-II :

Arrays: Dynamic Array, Preserve and Control arrays. **Procedure:** General procedure, General Methods for Passing Arguments to a Procedure, **Functions:** User-Interaction, String, Math, Date, Conversion Functions.
Modules: Form, Standard.

UNIT-III :

Menus: Creating, Adding Menu Items, Creating Shortcut, Adding Separators Bars, Submenus, Code for Menus. Creating Popup Menu: System, Custom. **Database Handling:** Database Concepts, Creating and Accessing Database, Using Data Control. **Using DAO:** Creating Search Programs, Numeric Search and Complex Search Programs.

UNIT-IV :

Using ADO Data Control, Data Link, ODBC Data Source name, Using Connection String, Creating Navigating buttons. Working with Advanced Data Controls : DataList Control, DataCombo Control, DataGrid Control and Msflexgrid Control. **Handling Errors :** Run Time, Trapping and Handling Error, ERR Object. Data Environment and Data Reports.

Reference Books:

1. VISUAL BASIC – to Advance by Soma Dasgupta [BPB Publication]
2. Evangelos Petroustos, Mastering Visual Basic 6.0 BPB Publication.
3. VISUAL BASIC 6 COMPLETE REFERENCE (TMH PUB)
4. Visual Basic 6 Deitel & Deitel (Pearson Education)
5. Mastering VB 6.0 Black Book -Peter - Norton-Techmedia.

B.C.A. Part II Semester III
Paper II
DATA BASE MANAGEMENT SYSTEM

UNIT- I :

DBMS : Definition: Databases, DBMS, Problems with traditional file processing system, Objectives of the database systems, Three level architectures of DBMS, Component of DBMS, Database Administrator, Database Users, Data model, Different types of data models, Concepts of Hierarchical, Network Models.

UNIT-II :

E-R Models : Basic Concepts, Entity, Attributes, Relation Ship, Mapping, Keys, Weak and Strong Entity Set, Problems on E-R Diagrams, Extended E-R Features: Specialization, Generalization, Aggregation, Problems on Reduction of an E-R Schema to Tables, Tabular representation of Strong, Weak entity Sets and Relationship Sets.

UNIT-III :

Relational Model: Structure, Relational Algebra, Fundamental Operations, Set – Intersection, Natural Join, Division and Assignment Operation. Extended Relational Algebra Operations, Aggregate Functions.

UNIT-IV :

Functional Dependency: Functional Dependency, Fully Functional Dependency, Partial Dependency, Transitive Dependency, Multi Valued Dependency. Normalization, Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF, 5NF). Problems on Normal forms.

Reference Books:

1. Data Base System Concepts By A SilbersChatz By Henry Korth And S.Sudarshan [Mcgraw-Hill ltd. New Delhi] 3rd Edition.
2. Introduction to Data Base Management by NAVEEN PRAKASH [Tata McGrawHill ltd.]
3. Bipin C. Desai, An Introduction to Database Systems, Galgotia Publications.
4. Raghu Ramakrishnan & Johannes Gerhrke, "Data Base Management Systems", Mc Graw Hill International Edition, 2000
5. Muzumdar, Introduction to Database Management Systems. TMH

B.C.A. Part II Semester III

Paper III

DATA STRUCTURES

UNIT - I :

LINKED LIST : Linked List, Representation of Single, Double, Header, Circular Single and Double Linked list, All possible operations on Single and Double linked List using Dynamic representation, Polynomial Representation and its Manipulation.

UNIT - II :

STACKS : Stacks terminology, Representation of Stacks in Memory, Operation on Stacks, Polish Notations, Translation of infix to postfix & prefix expression, Infix to Postfix Conversion, Evaluation of Postfix Expression, Recursion, Problems on Recursion, Quick Sort and Tower of Hanoi Problem.

UNIT - III :

QUEUE : Representation of Queues in Memory, Circular Queue. Dequeue and Priority Queue. Operations of above Structure using Array and Linked Representation.

SORTING AND SEARCHING: Selection Sort, Insertion Sort, Merge Sort, Efficiency of Sorting Methods, Big-O Notations.

Hash Tables, Hashing Technique, Collision Resolution Technique.

UNIT - IV :

TREES : Basic Terminologies, Representation of Binary Trees in Memory, Traversing of Binary tree, Binary Search Tree, Operation on Binary Search Tree, Heap Tree, Operation on Heap Tree, Heap Sort Method

GRAPHS : Basic Terminologies, Definition and Representation of Graphs in Memory: Linked List and Matrix Representation. Traversing graphs : BSF, DFS Method.

Reference Books:

1. Classical Data Structures : D. Samanta. PHI, New Delhi.
2. DATA STRUCTURE : LIPSCTUZ SCHUM OUTLINE SERIES
3. Data structure Using C++ : Y. Kanetkar
4. Data Structures Using C++: Tennenbaum
5. Data structures by Tremblay Sorenson
6. Data structures by Bhagat singh Naps

B.C.A. Part II Semester III
Paper IV
OPERATIONS RESEARCH – I

UNIT - I :

Introduction to Operation Research (OR) Origin and development of OR, Nature of OR, Characteristics of OR, Classification of Problems in OR, Models in OR, Phases of OR, Uses and Limitations of OR, Methodologies of OR, Applications in OR. Linear Programming – Concepts of Linear Programming Model, Mathematical Formulation of the Problem, Graphical solution methods.

UNIT - II :

Linear Programming Methods – Simplex Methods, Big M methods, Dual Simplex Method, TwoPhase methods. Duality in Linear Programming – Formulation of Dual Problem, Application of Duality.

UNIT - III :

Transportation Problem

Mathematical model for Transportation Problem, Types of Transportation Problem.

UNIT - IV :

Assignment Problem – Zero-One Programming Model for Assignment Problem, Types of Assignment Problem, Hungarian Method, Branch and Bound Technique for Assignment Problem.

Reference Books:

1. Operation Research by Kanti Swarup, P. K. Gupta, Man Mohan [Sultan]
2. Operation Research by R. Panneerselvam [PHI}
3. Introduction to Operation Research by Billy E. Gillet [TMH]
4. Operation Research by Hira Gupta
5. Operation Research Problems and Solutions by Sharma J. K. [MacMillan]
6. Operation Research Theory and Application by Sharma J. K., [MacMillan]

B.C.A. Part II Semester III

Paper V

WEB TECHNOLOGY - I

UNIT - I :

Introduction to Internet, History of Internet, Internet users, Internet working, Information on Internet, Requirements for connecting to Internet, Basic Internet Terms, Introduction to world wide web, Evaluation of world wide web, basic features, web browsers, popular web browsers, web servers, HTTP, URL, Search Engines, Search Engines categories, how to use Search Engines, Searching criterion.

UNIT - II :

HTML: Introduction, Objective, HTML Browsers, Windows Switching, HTML Command Tags, URLs, links, new web page creation, main body of the text, putting headers, adding paragraph , formatting text in HTML and font mechanism, Color settings, superscripts and subscripts and other manipulations on text and paragraphs, using directory and menu lists, creation of links, inserting graphics, using images, all manipulations on tables and its display, Detailed working with forms, allowing visitors to upload files, active images ,working with frames & framesets, Frames handling, scroll bars, alternatives to frames,

UNIT - III :

Introduction to browsers, Working with e-mail, Parts of e-mail text, working with messages.

DHTML: using DHTML in internet explorer, heading and horizontal line, hidden message, the message at the center of the page, moving boxes ,changeable box.

UNIT - IV :

Cascading style sheets

Introduction to css, creating style sheets, common tasks with CSS, Colors, the font - family, font metrics ,length units ,absolute units ,relative units ,the pixel unit ,percentages as values ,keywords as values, various properties such as the font -size property, font - size property etc, Assigning classes ,tags and attributes for applying classes, applying classes to an HTML tag, applying classes to other document parts ,the layer tag, CSS Tags

Reference Books:

1. Internet and web design by R Bangia, Second edition , firewall media
2. Multimedia and Wed technology by R Bangia
3. Internet and web designing by ITELS (Macmillan)
4. Web Enabled Commercial Application Development Using HTML, DHTML, JS, Perl by Ivan Bayross
5. Deitel, Deitel & Nieto, Internet and Worldwide Web how to Program, Pearson Education, PHI.
6. Internmet Programming with VBScript and Java Script.
Kathhleen Kalata, (Thomsaon Publication)
7. Programming the World Wide Web By. Robert W. Sebesta. (Pearson)
8. Web Technology Theory and Practice By: M Srinivasan (Pearson Publication)

B.C.A. Part II Semester III
Paper VI
DIGITAL ELECTRONICS – I

UNIT - I :

Number System and Data Representation

Number System : Binary, Octal, Decimal and Hexadecimal number system and their interconversion.

Binary Codes : BCD, Excess3 , Parity, Gray, ASCII, EBCDIC codes and their advantages and disadvantages.

UNIT - II:

Binary Arithmetic

Data Representation: Positive, negative, maximum and minimum number representation (related to 8 bit number), real number representation, underflow, overflow, range and accuracy. **Binary Arithmetic:** Binary addition, binary subtraction using 1's and 2's compliment.

UNIT - III:

Logic gates: Truth table, properties and symbolic representation of NOT, AND, OR, NOR, NAND, EXOR, EXNOR gates. NOR and NAND gates as a universal gates.

UNIT - IV:

Boolean Algebra.

Laws and Identities of Boolean algebra, DeMorgan's Theorem , use of Boolean Algebra for simplification of logic expression, K-Map for 2,3,4 variables, simplification of SOP and POS logic expression using K-Map.

Reference Books:

1. Digital Electronics by Gothman(PHI)
2. Digital and analogue technique by Navaneeth, Kale and Gokhale
3. Modern Digital Electronics by R. P. Jain

B.C.A. Part II Semester IV
Paper I
SOFTWARE ENGINEERING - I

UNIT - I :

Introduction to Software Engineering : The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process : Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

UNIT - II :

Process models : The waterfall model, Incremental process models, Evolutionary process models, The Unified process. **Software Requirements :** Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

UNIT - III :

Requirements engineering process : Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models : Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT - IV :

Design Engineering : Design process and Design quality, Design concepts, the design model.

Reference Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.
3. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
4. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
5. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
6. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

B.C.A. Part II Semester IV

Paper II

SQL AND PL/SQL

UNIT - I :

CODD'S Rules, Oracle Database Objects, Sub Languages of SQL, Data types, Operators.

DDL Statement: Creating Tables, Deriving Table from existing table, Altering, Dropping Tables. Integrity Constraints, Specifying Names for the Constraints, Viewing Integrity Constraints, Adding and Dropping Constraints. **DML Statements:** SELECT statement, Insert, Update, Delete, Working with Sequences and Synonyms. Built-in functions: Arithmetic, Date, Character, Conversion, Single row, Aggregate, Decode.

Joins, Set Operators and Sub queries. **DCL and TCL Statements:** Grant, Revoke, Commit, Rollback and Savepoints.

UNIT - II :

VIEWS: Creating Views, Dropping Views, Inserting, Updating and Deleting Data using Views, Types of Views. **PL/SQL Programming:** PL/SQL Data Types, Identifiers, Operators and Expressions, Iterative Statements, Conditional Statements, emphasis on Problems

UNIT - III :

Exception Handling : Predefined Exceptions, User defined Exceptions. **Cursors:** Declaring Cursors, Opening and Retrieving Records, Closing cursors. Attributes of Explicit and Implicit Cursors, Parameter Passing in Cursors. **Procedures :** Create and Drop Procedure, Creating Procedures with Parameters, Calling Procedures, Granting the EXECUTE Permission Problems on Exception Handling, Cursors and Procedures.

UNIT - IV :

Function: Creating and Dropping Function, Purity Levels in Functions, Executing Functions. **Triggers:** Create Triggers, Type of Triggers, Creating BEFORE and AFTER Triggers, INSTEAD-OF Triggers, Trigger Predicates, Inserting, Updating and Deleting Triggers, Enabling , Disabling and Dropping Triggers. Problems on Functions and Triggers

Reference Books:

1. Understanding ORACLE By Ivan Bayross [BPB Publication]
2. Database System Using Oracle: A Simplified Guide to SQL & PL-SQL: Nilesh Shah, PHI Publication.
3. Database Management Systems (Complete practical approach) by Sharad Maheshwari & Ruchin Jain, Firewall media
4. Dr. P.S.Deshpande SQL & PL/SQL for Oracle 10g Black Book
5. Scott Urman Programming PL/SQL TMH

B.C.A. Part II Semester IV
Paper III
THEORY OF COMPUTATION

UNIT - I :

Finite Automata and Regular Expression : Finite State systems, Basic Definitions, Non-deterministic finite Automata, Finite Automata with moves, Regular Expressions, Two way finite automata, Finite automata with output, Application on Finite Automata.

UNIT - II :

Properties of Regular Sets : The pumping lemma for Regular Sets, Closure properties of Regular sets, Decision Algorithms for Regular Sets. Context Free Grammars, Context Free Grammar, Derivation Tree,

UNIT - III :

Simplification of context Free Grammars, Chomsky Normal form, Greibach normal form, The existence of inherently ambiguous context free languages. Properties of Context free languages : The pumping lemma for CFL's , Closure properties of CFL's,

UNIT - IV :

Push Down Automata : Informal description, Definitions, Push – Down Automata & Context free languages.

Reference Books:

1. Introduction to Automata Theory, Languages and Computation: John E. Hopcroft & Jeffrey D. Ullman
2. Theory of Computer Science : E. V. Krishnamoorthy.
3. Theory of computer Science : K. L. P. Mishra.

B.C.A. Part II Semester IV
Paper IV
OPERATIONS RESEARCH - II

UNIT - I :

Game Theory – Terminologies of Game Theory, Two Person Zero-Sum Games, The Maximin-Minimax Principle, Games without Saddle points-Mixed Strategies, Graphical Solution of $2 \times n$ and $m \times 2$ games, Dominance Property. Introduction, Decision under Certainty, Decision under Risk, Decision under Uncertainty, Decision Tree.

UNIT - II :

Network Scheduling by CPM/PERT – Introduction, Basic Concept, Constraints in Network, Critical Path Method (CPM), PERT Network, PERT calculations, Time-Cost trade-off aspects in Network Technique, Advantage of Network (PERT/CPM).

UNIT - III :

Inventory Control

Introduction, Inventory Control, Selective Control Techniques, Types of Inventory, Economic Lot Size Problem, Problem of EOQ with shortage, Inventory Control Techniques – Uncertainty Demand, Stochastic Problem, Inventory Control with Price Breaks.

UNIT - IV :

Queuing Theory

Introduction, Terminologies in Queuing System, Characteristics of Queuing System, Poisson Process and Exponential Distribution, Classification of Queues, Definition of Transient and Steady states, Poisson Queues, Non-Poisson Queuing Systems, Cost-Profit Models in Queuing, Queuing Control.

Reference Books:

1. Operation Research by Kanti Swarup, P. K. Gupta, Man Mohan [Sultan]
2. Operation Research by R. Panneerselvam [PHI]
3. Introduction to Operation Research by Billy E. Gillet [TMH]
4. Operation Research by Hira Gupta
5. Operation Research Problems and Solutions by Sharma J. K. [MacMillan]
6. Operation Research Theory and Application by Sharma J. K., [MacMillan]

B.C.A. Part II Semester IV

Paper V

WEB TECHNOLOGY - II

UNIT - I :

Introduction, JSP lifecycles, Elements in JSP Pages , values and variables, operators, loops and various statements in java script, Date object, Math object, string object, window events, working with forms, document object, screen object, navigator object, images and animation.

UNIT - II :

Java script objects, Implicit JSP Objects, JSP Object scopes, JSP Tags, Declarations, Directives, JSP Tags, JSP Exceptions, Expressions, Scriptlet, Actions, Expression Language, JSP Standard Tag library, JSP Custom Tag library, Java Script security.

UNIT - III :

VB Script:

Adding VB Script code to HTML, Adding script to your document, Data types, Arrays in script, Messages, Subroutines, functions, if..then..else, for..next loop, do while or do until, Select case construct, Manage your web site with Task and Reports : Keep track of work eith tasks, Check your site with your web site report, Publishing web site to a WPP host server.

UNIT - IV :

Web Services :

Ev0lution of the concept, Purpose, standards, Use cases, programming models, SOAP Based web services, WSDL,, SOAP, Structure of SOAP messages, REST based Web Services, REST principles, Resource Orientation, SOAP vs. REST.

Reference Books:

1. Internet and web design by R Bangia, Second edition , firewall media
2. Multimedia and Wed technology by R Bangia
3. Internet and web designing by ITELS (Macmillan)
4. Web Enabled Commercial Application Development Using HTML, DHTML, JS, Perl by Ivan Bayross
5. Deitel, Deitel & Nieto, Internet and Worldwide Web how to Program, Pearson
a. Education, PHI.
6. Internmet Programming with VBScript and Java Script. Kathhleen Kalata, (Thomsaon Publication)
7. Programming the World Wide Web By. Robert W. Sebesta. (Pearson)
8. Web Technology Theory and Practice By: M Srinivasan (Pearson Publication)

B.C.A. Part II Semester IV
Paper VI
DIGITAL ELECTRONICS – II

UNIT - I :

Combinational / Sequential Circuits

Combinational circuits: Half adder, Full Adder, Parallel adder, Half subtractor, Full Subtractor, 4-bit binary adder subtractor, Multiplexer, Demultiplexer, Decoder, Encoder, Parity detector.

UNIT - II :

Sequential Circuits: Flip-Flops : Construction and working of RSFF, CkRSFF, DFF, TFF, JKFF, and JKMSFF . **Counters:** Construction and working of asynchronous, synchronous, up-down counter, shift registers and their types.

UNIT - III :

Architecture of 8086 and Assembly Language Programming Block diagram of 8086, Pin diagram of 8086, Addressing modes,

UNIT - IV :

Instruction set: Data transfer, Arithmetic, Logical, String manipulations, Control Transfer, Unconditional branch, Conditional branch, Flag, Processor control. Assembler directives and operators, simple assembly programs.

Reference Books:

1. Digital Electronics by Gothman(PHI)
2. Digital and analogue technique by Navaneeth, Kale and Gokhale
3. Fundamental of Microprocessor by B Ram
4. Microcomputers Systems: The 8086/8088 family by Liu. Gibson
5. Introduction to Microprocessor by Douglas V Hall (McGraw Hill.)

B.C.A. Final Semester V
Paper I
COMPUTER GRAPHICS - I

UNIT - I :

Introduction and Primitives

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

UNIT - II :

Output primitives : Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms .

UNIT - III :

2D Transformations

2-D geometrical transforms : Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

UNIT - IV :

2-D viewing : The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

Reference Books:

1. “Computer Graphics Principles & practice”, second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.
2. “Computer Graphics”, second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. “Principles of Interactive Computer Graphics”, Neuman and Sproul, TMH.
5. Computer Graphics, Amrendra N Sinha, Arun D Udai TMH
6. Computer Graphics, Steven Harrington, TMH

B.C.A. Final Semester V
Paper II
COMPILER CONSTRUCTION

UNIT - I :

Compilers and translators, need, the structure of a compiler, Lexical Analysis, Syntax analysis, Intermediate code Generation, Optimization, Code Generation, Book keeping, Error Handling

UNIT - II :

High Level programming languages, Definitions of programming languages, The lexical and syntactic structure of a language, Data elements, structures, Operators, Assignment Statements, Data Environments, Parameter transmission, Storage management.

UNIT - III :

The role of the lexical analyzer, Approach to the design of lexical analyzer, Implementation of lexical analyzer, Context free grammars, Derivations and parse trees, Ambiguous grammar.

UNIT - IV :

Parsers, Shift-reduce parsing, Operator precedence parsing, Top-down parsing, predictive parsers, Symbol Table , Code Optimization: The principal source optimization, Loop optimization, The DAG representation of basic blocks, Code Generation : A machine model, a simple code generator, Register Allocation and assignment.

Reference Books:

1. Principles of Compiler Design - A.V. Aho, J. D.Ullman : Pearson Education.
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.
4. Compiler Construction, Loudon, Thomson.

B.C.A. Final Semester V

Paper III

VB.NET

UNIT - I :

VB.NET

Introduction to .Net, The .NET framework, The .NET Programming Framework, .NET Language, The Class .NET Library, Vb.NET, Windows Application using VB .NET

Class: Creating a New Class, defining and using a New Object, Constructor & Destructor
Inheritance: Inheritance Properties and Methods, Inheriting Constructors, Overriding Methods, Creating a Derived Class

UNIT - II :

Interface Design & Implement: Abstraction & Interfaces on Object Oriented Software Design, Interface & Inheritance, Realizing the benefits of Interfaces, Implicit Interface, Explicit Interface – Abstract Class of Explicit Interface, Implementing Interfaces – Interface Implementation Semantics, Implementing ICloneable, Implementing IComparable, Accessing & using the Implement, Compound Interfaces

UNIT - III :

User Interface: Helper Forms, Message Process, Dialog Process, Owned Forms

Menus: Creating a Menu, Functionality to the Menu Items, Enhancing the Menu, Disabling Items on the Windows Form Menus, Creating Context Menu – Step by Step, Add Functionality to the Menu Items

Toolbar: Adding the Toolbar and buttons, Defining an Icon for the Toolbar and Buttons, Defining an ICON for a Toolbar Button, Adding Functionality to the Toolbar

MDI Application: The Basics, Building an MDI Application, Building – In Capabilities of MDI Applications, Accessing Child Forms, Ending an MDI Applications, A Scrollable PictureBox

UNIT - IV :

Advanced Interface Patterns, Adapters, Delegates & Events: Adapters & Wrappers, Interfaces Adaptation in Action – COM - .NET interop, The Adapter Pattern in .NET, The Adapter Pattern Event – Model, Delegates – Understanding Delegates, Declaration of the Delegates, Early Bound Delegates Declares, Late Bound Delegates Declares, Sorting Data with Delegates, Multicast Delegates, .NET Framework Event Model – Delegates & Events, Delegates Events verses Adapter Events, Delegates verses Function Pointers
Error Handling & Prevention: Types of Errors – Design Time Error, Runtime Error, Logic Error

Structured Exception Handling: Exception Structured verses Unstructured Exception Handling, Try.....Catch.....Finally Statement, Exception Class.

Debugging: Break Mode, Starting Debugging, Controlling the Flow during Debugging, Debugging Tools

Reference Books:

1. Evangelos Petroustos, Mastering Visual Basic 6.0 BPB Publication.
2. John Smiley Learn Program with Visual Basic 6
3. Wallace Wang Visual Basic 6 for Dummies (for Windows)
4. VISUAL BASIC 6 COMPLETE REFERENCE (TMH PUB)
5. Deitel & Deitel Visual Basic 6 (Pearson Education)
6. Bradly, VB.Net TMH

B.C.A. Final Semester V
Paper IV
SOFTWARE ENGINEERING - II

UNIT - I :

Creating an architectural design : Software architecture, Data design, Architectural styles and patterns, Architectural Design.

UNIT - II :

Testing Strategies : A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

UNIT - III :

Product metrics : Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Metrics for Process and Products : Software Measurement, Metrics for software quality.

UNIT - IV :

Risk management : Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management : Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

Reference Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.
3. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
4. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
5. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
6. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

B.C.A. Final Semester V

Paper V

PHP - I

UNIT - I :

Introduction to PHP: What Does PHP Do, A Brief History of PHP, Installing PHP, A Walk Through PHP Language **Basics:** Lexical Structure, Data Types, Variables, Expressions and Operators, Flow-Control Statements, Including Code, Embedding PHP in Web Pages, Installing and Configuring PHP on Windows and Linux Platforms

UNIT - II :

Functions: Calling a Function, Defining a Function, Variable Scope, Function Parameters, Return Values, Variable Functions, Anonymous Functions, Strings: Quoting String Constants, Printing Strings, Accessing Individual Characters, Cleaning Strings, Encoding and Escaping, Comparing Strings, Manipulating and Searching Strings, Regular Expressions, POSIX-Style Regular Expressions, Perl-Compatible Regular Expressions,

UNIT - III :

Arrays: Indexed Versus Associative Arrays, Identifying Elements of an Array, Storing Data in Arrays, Multidimensional Arrays, Extracting Multiple Values, Converting Between Arrays and Variables, Traversing Arrays, Sorting, Acting on Entire Arrays, Using Arrays

UNIT - IV :

Reading data in web pages: Setting Up Web Pages to Communicate with PHP, Handling Text Fields, Text Areas, Check Boxes, Radio Buttons, List Boxes, Password Controls, Hidden Controls, Image Maps, File Uploads. **Handling Buttons:** Making Button Data Persist, Using Submit Buttons as HTML Buttons.

Reference Books:

1. PHP 5.1 for beginners by Evan Bayross and Sharman Shah, SPD Publications
2. PHP 5.2 The Complete Reference by Steven Holzner, Mc Graw Hill Edition 2008.
3. Programming PHP by Rasmus Lerdorf and Kevin Tatroe, Orilly Publications

B.C.A. Final Semester V
Paper VI
DATA COMMUNICATION AND NETWORK - I

UNIT - I :

Data Communication

Data Transmission- Concept and Terminology, Analog & Digital Data Transmission, Transmission Impairment, Transmission Media.

Data Encoding- Digital Data, Analog Data, Digital Signal, Analog Signal.

UNIT - II :

Digital Data Communication: Asynchronous and Synchronous transmission, Error detection technique, Interfacing.

Data Link Control: Line configurations, Flow control, Error control, Data link control protocols. Multiplexing-Frequency division multiplexing, Synchronous Time Division Multiplexing.

UNIT - III :

Circuit Switching: Communication Networks, Circuit switching, Single Node network, Digital switching concept, Control Signaling.

UNIT - IV :

Packet Switching: Packet switching principles, Virtual circuits and diagrams, Routing, Traffic control, X.25. LAN & MAN- LAN,MAN technology, Bus, Tree, Star and Hybrid Topologies, Optical fiber Bus, Ring Topology, Medium Access Control Protocols, LAN/MAN standards.

Reference Books:

1. William Stallings, Data and Computer Communication, PHI Publication.
2. Forouzan, Data Communication and Networks, Tata McGraw Hill.
3. Godbole, Data Communication and Network, TMH
4. Tanenbum, Computer Networks , ,PHI Publication.
5. Comer Internetworking with TCP/IP Vol-1, PHI Publication

B.C.A. Final Semester VI
Paper I
COMPUTER GRAPHICS - II

UNIT - I :

3D Transformations

3-D object representation : Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT - II :

3-D Geometric transformations : Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing : Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

UNIT - III :

Visible surface detection methods : Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

UNIT - IV :

Computer animation : Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

Reference Books:

1. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.
2. "Computer Graphics", second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
5. Computer Graphics, Amrendra N Sinha, Arun D Udai TMH
6. Computer Graphics, Steven Harrington, TMH

B.C.A. Final Semester VI
Paper II
PROGRAMMING IN JAVA

UNIT - I :

Introduction to Java: -History of Java, features of Java, getting started with Java.

Java programs:-Introduction of Application & Applets. **Variables:** -Variable naming, variable initialization, assign values, Rules of variables, Scope of variable. **Operators:** - Arithmetic, Assignment, Unary, Comparison, Shift, Bit- Wise, Logical, Conditional, New, Special, Relational. Data types:-Integers, Char, String, Float etc. Typecasting:

Tokens: -Java tokens Order of precedence of operators Streams: - Input and output.

UNIT - II :

Creating a class & subclass: -Declaring a class, Naming class, Rules to assign Class & Subclass, Creating a new object, Class of an object. **Data members:** -Declaring data member, Naming variables, using class members. **Methods:** -Using data members, Invoke a method, passing arguments to a method, calling method. **Access Specifier & Modifiers:** -Public, Private, Protected, Static & Final. **Overloading:** -Method overloading, Constructor overloading. **Java class library:** - Different types of classes.

Decision making & loops:-If-then-else, Switch,?: operator, While-loop, do-while loop, for. **Array:** -Creating an array, one-dimensional array, two-dimensional array. **String:** - String array, string methods. **Inheritance:** -Single & multiple inheritances **Interfaces:** - Defining interfaces, extending interfaces, implementing interfaces.

UNIT - III :

Packages: -Java API packages, creating packages, accessing packages, adding a class to packages. **Import statement:** - Introduction & implementation of import statement.

Applets:-Introduction to Applets & Application, how applets application are different creating An applet. Applets life cycle, designing a web page, creating an executable applet, running the applet, applet tags, passing a parameter to applet, HTML tag, Converting applet to application. **Threads:**-Overview of threads, single & multiple threads, life cycle of threads, stopping & blocking threads, working with threads, priority to thread, synchronization. **Exceptions & Errors:**-Introduction, types of error, exception, syntax of exception, handling techniques, exception for Debugging.

UNIT - IV :

Event: -Event driven programming, handling an (AWT) events. **Graphic class:-** Introduction, the graphic classes, drawing & filling of lines, rectangle, circle & ellipse, arcs, polygons, text & fonts, creating a font class, font objects, text, coloring object.

Streams:-Introduction, Abstract stream classes, file input & output.

AWI Applications: -Creating a GUI using AWT toolkit, using component class, frames.

Components & Control: -Textfield, textarea class, label, button, choice, list, checkbox, class, and combo. **Menus:** -Creating a popup menus. **Image:** - Type of image, Properties of an image, Displaying an image. **Layouts:** -Using Window Listener interface, Different types of Layout, Layout manager, Flow manager, Grid manager. **Container:** -Different types of container (Frame, Dialog, Panel)

Reference Books:

1. Programming with Java a primer II edition:-E Balaguruswamy(Tata McGraw-Hill)
2. Java Programming (For absolute beginners) Russell PHI
3. Black Book on Java
4. Java-Complete References

B.C.A. Final Semester VI

Paper III

ASP.NET

UNIT - IV :

Introduction to XML

Introduction to XML, creating DTD, elements and attributes definitions. XML schema. Defining simple and complex types. Namespaces, Schemas and validation. Cascading style sheets (CSS) L and XML, Anatomy of a style, creating and calling style sheets for an XML/HTML document. Layout with CSS. Setting up various properties of elements using CSS. Formatting text with CSS, XML schemas, writing Simple sheets using XSLT, SAX and DOM Parsers, SOAP introduction.

UNIT - II :

Introduction to ASP .NET

Introduction to ASP .Net, Types, Object and Namespaces, Setting up ASP .NET and IIS, ASP .NET configuration, ASP .NET Application, Web form Fundamentals, Web Controls, Global.asax Application File, Responding toPostBack Events in ASP .NET.

UNIT - III :

ASP .NET Validations and Rich Controls: Calendar Control, AdRotator, Advertisement File and AdRotator Class, Server-side Validation, Client –side Validation, Validation Controls, Validated Customer Form. Stat Management, Tracing, Logging and Error Handling.

UNIT - IV :

Accessing Data with ADO.NET Relational Databases and SQL, ADO .NET Object model, Working with Data –Bound Controls, Populating a DataGrid, DataList and Repeater, Customizing DataSet and Combining Data Tables, Changing Database records accessing, Updating, Deleting and Creating records, Difference between ADO .NET and XML, Adding Controls, Data binding, Database Connectivity.

Reference Books:

1. Beginning XML By Wrox Press
2. XML how to program By Deitel and Deitel
3. Web Enabled Commercial Application Deveopement using HTML, DHTML, JAVA Script, and PERL-CGI By Ivan Bayross
4. The Complete Reference By Thomas Powell Tata MacGraw Hill
5. ASP .NET-The Complete Reference Tata MacGraw Hill

B.C.A. Final Semester VI
Paper IV
SOFTWARE TESTING

UNIT - I:

Introduction: Testing as an Engineering Activity, Testing as a Process, testing axioms, Basic Definitions Software Testing Principles, The Tester's Role in a Software Development Organization, Origins of Defects, cost of defects, Defect Classes, The Defect Repository and Test Design, Defect Examples, Developer/Tester Support for Developing a Defect Repository, Defect Prevention Strategies.

UNIT - II:

Test Case Design : Test Case Design Strategies, Using Black Box Approach to Test Case Design, Random Testing, Requirements based testing, Boundary Value Analysis, Decision tables, Equivalence Class Partitioning, State-based testing, Cause-effect graphing, Error guessing, Compatibility testing, User documentation testing, Domain testing

Using White Box Approach to Test design, Test Adequacy Criteria, static testing vs. structural testing, code functional testing, Coverage and Control Flow Graphs, Covering Code Logic, Paths, Their Role in White-box Based Test Design, code complexity testing, Evaluating Test Adequacy Criteria.

UNIT - III:

Levels Of Testing : The Need for Levels of Testing, Unit Test, Unit Test Planning, Designing the Unit Tests, The Test Harness, Running the Unit tests and Recording results, Integration tests, Designing Integration Tests, Integration Test Planning, Scenario testing, Defect bash elimination.

System Testing, Acceptance testing, Performance testing, Regression Testing, Internationalization testing, Ad-hoc testing - Alpha , Beta Tests, testing OO systems, Usability and Accessibility testing, Configuration testing, Compatibility testing, Testing the documentation, Website testing

UNIT - IV:

Test Management : People and organizational issues in testing, organization structures for testing teams, testing services, Test Planning , Test Plan Components, Test Plan Attachments, Locating Test Items – test management, test process, Reporting Test Results, The role of three groups in Test Planning and Policy Development, Introducing the test specialist, Skills needed by a test specialist, Building a Testing Group.

Reference Books:

1. Srinivasan Desikan and Gopaldaswamy Ramesh, "Software Testing – Principles and Practices", Pearson education, 2006.
2. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003.
3. Ron Patton, " Software Testing", Second Edition, Sams Publishing, Pearson education, 2007
4. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004.
5. Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, 1995.
6. Boris Beizer, "Software Testing Techniques" – 2nd Edition, Van Nostrand Reinhold New York, 1990.
7. Aditya P. Mathur, "Foundations of Software Testing – Fundamental algorithms and techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008

B.C.A. Final Semester VI

Paper V

PHP - II

UNIT - I :

PHP Browser-Handling Power: Using PHP's Server Variables, Using HTTP Headers, Getting the User's Browser Type, Redirecting Browsers with HTTP Headers, Dumping a Form's Data All at Once, Handling Form Data with Custom Arrays, Putting It All in One Page.

Data Validation: Performing Data Validation, Checking if the User Entered Required Data, Requiring Text, Persisting User Data, Client-Side Data Validation, Handling HTML Tags In User Input.

UNIT - II :

Classes and Objects: Terminology, Creating an Object, Accessing Properties and Methods, Declaring a Class, Introspection, Serialization, Web Techniques: HTTP Basics, Variables, Server Variables, Server Information, Processing Forms, Setting Response Headers, Session, cookies, files, Maintaining State, SSL.

UNIT - III :

Working With Database: Using PHP to Access a Database: Relational Databases and SQL, Mysql database Basics, Execute SQL Queries In PHP, Accessing The Database In PHP: Connecting To The Database, Reading, Displaying, Closing Connection, Database Manipulation: Inserting, Updating, Sorting and Deleting Records. Advanced Database Techniques.

UNIT - IV :

Setting a Cookie, Reading a Cookie, setting cookies Expiration, Deleting Cookies. Working with FTP: Downloading with FTP, Uploading files with FTP, Deleting a file with FTP, Creating and Removing Directories with FTP, Sending E-mail, Advanced E-mail, Adding Attachments to E-mail, Storing Data in Sessions, Writing a Hit Counter Using Sessions. PHP Code, Shell Commands.

Reference Books:

1. PHP 5.1 for beginners by Evan Bayross and Sharman Shah, SPD Publications
2. PHP 5.2 The Complete Reference by Steven Holzner, Mc Graw Hill Edition 2008.
3. Programming PHP by Rasmus Lerdorf and Kevin Tatroe, Orilly Publications

B.C.A. Final Semester VI
Paper VI
DATA COMMUNICATION AND NETWORK - II

UNIT - I :

Communication Architecture

Protocols & Architecture: Protocols, The Layers Approach, OSI Model, TCP/IP protocol suite, System Network Architecture.

Internetworking: Principles of Internetworking, Bridges, Routers, Repeaters, Gateways, Connection Oriented Internetworking, Connectionless Internetworking, Connectionless Internetwork Protocol, Router-level protocol.

UNIT - II :

Transport Protocols- Transport services, Protocol Mechanism, Network services, ISO Transport Standards, TCP, UDP, TCP and UDP Packet format, Lightweight Transport Protocol.

UNIT - III :

Session Services & Protocols- Session Characteristics, OSI Session Services, Definition, OSI Session Protocol definition. DNS, FTP, HTTP.

UNIT - IV :

Digital Network

ISDN & Broadband ISDN : Overview of ISDN, Architecture and Interfaces of ISDN, Transmission structure, User Access, ISDN protocols, Broadband ISDN(B-ISDN).

Reference Books:

1. William Stalling, Data and Computer Communication, PHI Publication.
2. Forouzan, Data Communication and Networks, Tata McGraw Hill.
3. Godbole, Data Communication and Network, TMH
4. Tanenbum, Computer Networks, PHI Publication.
5. Comer Internetworking with TCP/IP Vol-1, PHI Publication