41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING

Examination Control Division

2072 Kartik

Exam.	Supplementary / Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *Assume suitable data if necessary.*

1. What are typical software characteristics? What do you mean by software crisis? Elaborate. [4+4]
2. What are the reasons for software runways? Explain how both the waterfall model of the software process and prototyping model can be accommodated in the spiral process model. [2+6]
3. What is a behavior model? How does it differentiate from data model of the same system? Explain with examples and model. [3+3+2]
4. How many levels are there in CMM? Explain in detail about all the levels. [2+5]
5. Why software quality standards are needed? What are the metrics for software project size estimation? Discuss cyclomatic complexity with suitable example. [2+2+3]
6. Compare and contrast Verification with Validation. What do you mean by critical systems? How does partitioning augments in V and V process? Explain with example. [4+2+2+2]
7. "Survival of the fittest" is valid to software industry in today's competitive market. Explain the statement in the context of issues modern software configuration management must address nowadays. [8]
8. Differentiate between functional testing and structural testing. A web enabled system with a robust back-end database, estimated to be of about 200 KLOC when complete. Assuming the system will work in semidetached mode, calculate the effort required per month, the development time, average number of staff required and the productivity rate. Consider COCOMO-2 for reference. [2+3]
9. Compare the following: [5×2]
   i) Client server vs Distributed object architecture
   ii) Real time vs Non-real time operating system
   iii) Walk through vs Inspection in testing process

41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- Candidates are required to give their answers in their own words as far as practicable.
- *Attempt All questions.*
- *The figures in the margin indicate Full Marks.*
- *Assume suitable data if necessary.*

1. Why it is so difficult to gain a clear understanding of what the customer wants? What are the guidelines for the requirement elicitation process? [4+4]
2. Explain details about current model of software process. Explain why the waterfall model of the software process is not an accurate reflection of software development activities. [4+4]
3. Read the case mentioned hereunder carefully and: [5+5]
   a) Make DFD level 1 for the system
   b) What do you mean by DFD balancing in the given case?

   A customer visits an online movie portal. He chooses DVD movies from three different categories: Sci-Fi, Classical and Romantic and places the order for the same. He is supposed to be able to make online payment using his bank details. Upon successful transaction he is expected to receive confirmation through his e-mail.
4. Explain why it may be necessary to design the system architecture before specifications are written. Explain client-server architecture with appropriate example. [4+5]
5. How do real-time software and operating system differ from non-real time software and operating system? Describe Data Acquisition System. [4+4]
6. What are the benefits of CBSE? How closely code generation feature of case tools are associated with CBSE? Explain. [3+5]
7. How does the SEI CMM ensure quality aspects of any complex software under development? What are the differences between ISO and CMM? [4+3]
8. What is COCOMO? Calculate COCOMO effort, development time in calendar month, average staffing and productivity for project of application program that is estimated to be 49,200 lines of code. [3+5]
9. Establish the chronology among component, release unit and integration testing. Also write distinctive notes on their testing. [3+4]
10. Write short notes on: [3×3]
    a) Software Requirement Specifications (SRS)
    b) Generator based reuse
    c) Change management

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INSTITUTE OF ENGINEERING
Examination Control Division
2071 Shawan

Exam.	New Back (2066 & Latter Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering (CT601)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

1. Explain why the waterfall model of software development is not an accurate reflection of software development activities. Explain better alternative model. [10]
2. Give your view on requirement engineering and requirement specification. [10]
3. What is behavior modeling in system analysis process? Illustrate with a sample model diagram of any web-based transaction portal system. [5]
4. Explain the versioning process in the context of configuration management with all the associated components. [5]
5. How the modular decomposition concept is practiced in system design processes? Illustrate with your own example of a second level DFD. [4+6]
6. What specific considerations are to be made while designing typical software to be operated in real-time environment? Explain. [5]
7. Prepare a brief notes on design pattern with statement of their benefits. [5]
8. What is verification planning? Why such planning is required? What are the different steps involved in it? Explain. [8]
9. What is exception and error testing in the context of system implementation? [5]
10. What is COCOMO? Illustrate the calculation with an appropriate example. [5]
11. Write Short notes on: (any three) [4×3]
    a). Software testing metrics
    b). CMM level
    c). Statistical quality assurance
    d). CBSE

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Why it is so difficult to gain a clear understanding of what the customer wants? What are the guidelines for the requirement elicitation process? [4+4]
2. Explain details about current model of software process. Explain why the waterfall model of the software process is not an accurate reflection of software development activities. [4+4]
3. Read the case mentioned hereunder carefully and: [5+3]
   a) Make DFD level 1 for the system
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   A customer visits an online movie portal. He chooses DVD movies from three different categories: Sci-Fi, Classical and Romantic and places the order for the same. He is supposed to be able to make online payment using his bank details. Upon successful transaction he is expected to receive confirmation through his e-mail.
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8. What is COCOMO? Calculate COCOMO effort, development time in calendar month, average staffing and productivity for project of application program that is estimated to be 49,200 lines of code. embedded type [3+5]
9. Establish the chronology among component, release unit and integration testing. Also write distinctive notes on their testing. [3+4]
10. Write short notes on: [3×3]
    a) Software Requirement Specifications (SRS)
    b) Generator based reuse
    c) Change management

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4(TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT 601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is software crisis? Explain with the help of an example. [5]
2. Describe Spiral model for software development. What are its advantages and disadvantages? [5]
3. A restaurant uses an information system that takes customer orders, sends the order to the kitchen, monitors the goods sold and inventory and generates reports for management. List functional and non-functional requirements for this Restaurant Information System. [5]
4. Explain requirement management process with necessary illustration. [5]
5. Why system modeling is important? Mention the weakness of structured analysis method? [2+3]
6. What is an architectural design? Why it is important in software engineering? Explain multiprocessor architecture with example. [2+3+5]
7. Define a real-time system. Explain the real-time operating system and its components? [1+4]
8. What are the benefits and problems of software reuse? What factors need to be taken care of for software reuse planning? [5]
9. Explain why program inspection are an effective technique for discovering errors in a program? What types of error are unlikely to be discovered through inspections? [5+5]
10. Consider a program for the determination of the nature of roots of a quadratic equation. Its input is a triple of positive integers (say a, b, c) and values may be from interval [0, 100]. The program output may have one of the following words. [Not a quadratic equation; Real roots, Imaginary roots, Equal roots]. Design test cases to test this program. [5]
11. How do you conduct formal technical review? Explain Garvin's quality dimensions. [6+4]
12. Write short notes on: (any four): [2.5×4]
    a) Change Management
    b) Version and Release Management
    c) COCOMO
    d) Component based Software Engineering
    e) Feasibility Study

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35 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Baishakh

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

Subject: - Software Engineering

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What are the advantages and limitations of water fall process model? List out various models of software development. Explain the limitations of water fall model in detail. [10]
2. Explain software requirement specification (SRS). What are the characteristics of a good software requirement specification document? [10]
3. What is Software Quality Assurance (SQA)? What steps are required to perform Statistical SQA? [10]
4. What problems may be encountered when top down integration is chosen? What is regression testing? [10]
5. What are the main objectives of Formal Technical Reviews (FTR)? What is clean room software engineering? [10]
6. What are the types of software maintenance? Give some design principles for maintainability. [10]
7. Write notes on: [5×4]
   a) Software Safety
   b) Cohesion and Coupling
   c) Capability Maturity Module
   d) Software Reengineering

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35 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2067 Ashadh

Exam.	Regular/Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

Subject: - Software Engineering

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Compare between waterfall model and spiral model of software development process. What is the role of user participation in selection of life cycle model? [11]
2. Explain the importance of requirement engineering. List out requirement elicitation techniques. What are the problems in formation of requirements? [12]
3. What are the characteristics of Object Oriented Programming? What are the main advantage of OOP? [10]
4. Explain how CMM encourages continuous improvement of software process. Describe various key process areas of CMM at various maturity levels. [12]
5. Explain Computer Aided Software Engineering (CASE), CASE environment and CASE tools? [11]
6. Why does software project fail after it has passed through acceptance testing? Explain integration testing. [8]
7. Define the following in the context of software engineering. [4×4]
   a) Symbolic execution
   b) Software errors and their import on cost
   c) Software reliability models
   d) Regression testing

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22 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Kartik

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, B.Agri.	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Probability and Statistic *(SH602)*

- ✓ *Candidates are required to give their answers in their own words as far as practicable.*
- ✓ *Attempt <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *<u>Necessary tables are attached herewith.</u>*
- ✓ *Assume suitable data if necessary.*

1. What is absolute and relative Measure of Dispersion? Construct a Box plot from the following data of marks of students as: [1+5]

Marks	10-20	20-30	30-40	40-50	50-60
No. of students	2	6	22	13	7

2. State the law of addition of probability. In a training, the 70% of persons achieved a rating of Satisfactory. Of those as rated as Satisfactory, 80% had Acceptable Scores on the personality test. Of those rated as Unsatisfactory, 35% had Acceptable Scores. Find the probability that an applicant would be a Satisfactory trainee given the Acceptable scores on personality test. [2+4]

3. Define Negative binomial distribution with its important characteristics. [5]

4. A particularly long traffic light on your morning commute is green 20% of the time that you approach it. Assume that each morning represents an independent trial. [5]

   i) Over five mornings, what is the probability that the light is green on exactly one day?
   ii) Over 20 mornings, what is the probability that the light is green on exactly four days?

5. The distribution function for a random variable X is [5]

$$F(x) = 1 - e^{-2x} \text{ for } x \geq 0$$
$$= 0 \quad \text{for } x < 0$$

   i) Find $P(X > 2)$
   ii) Find mean and variance of the variable X.

6. Define Standard Normal Distribution with their respective probability density function and describe its properties. [5]

7. An article in Wear (Vol. 152, 1992, pp. 171-181) presents data on the fretting wear of mild steel and oil viscosity. Representative data follow, with x = oil viscosity and y = wear volume (10^{-4} cubic millimeters). [5]

y	240	181	193	155	172	110	113	75	94
x	1.6	9.4	15.5	20.0	22.0	35.5	43.0	40.5	33.0

   i) Fit the simple linear regression model using least
   ii) Predict fretting wear when viscosity x = 30

8. What are the two regression coefficients and what do they represent? Write the properties of regression coefficient. [5]

9. Define Central Limit Theorem. An electronics company manufactures resistors that have a mean resistance of 100 ohms and a standard deviation of 10 ohms. The distribution of resistance is normal. Find the probability that a random sample of 25 resistors will have an average resistance less than 95 ohms. [5]

10. Define standard error of sample mean. A population consist of the four numbers 12, 19, 13, 16. [5]

i) Write down all possible sample size of two without replacement.
ii) Find standard error of the sample mean.

11. Describe the procedure of the test of significance for difference of two population mean for large sample. [5]

12. In the investigation of a citizens' committee complaint about the availability of fire protection within the county, the distance in miles to the nearest fire station was measured for each of five randomly selected residences in each of four areas. [5]

Area 1	7	5	5	6	8
Area 2	1	4	3	4	5
Area 3	7	9	8	9	8
Area 4	4	6	3	7	5

Do these data provide sufficient evidence to indicate a difference in mean distance for the four areas at the = 0.05 level of significance?

OR

The diameter of steel rods manufactured on two different extrusion machines is being investigated. Two random samples of sizes $n_1 = 15$ and $n_2 = 17$ are selected, and the sample means and sample variances are $\bar{x}_1 = 8.73, s_1^2 = 0.35, \bar{x}_2 = 8.68$, and $s_2^2 = 0.40$, respectively. Assume that $\sigma_1^2 = \sigma_2^2$ and that the data are drawn from a normal distribution. Is there evidence to support the claim that the two machines produce rods with different mean diameters? Use $\alpha = 0.05$ in arriving at this conclusion.

13. A random sample of 500 adult residents of Maricopa County found that 385 were in favor of increasing the highway speed limit to 75 mph, while another sample of 400 adult residents of Pima County found that 267 were in favor of the increased speed limit. Construct 95% confidence interval on the difference in the two proportions. [5]

14. Define chi-square distribution. From the following data can you conclude that there is association between the purchase of brand and geographical region? [5]

	Region		
	Central	Eastern	Western
Purchase brand	40	55	45
Do not purchase brand	60	45	55

Use 5% level of significance.

15. The following table shows the number of hours 45 hospital patients sle following the administration of a certain anesthetic. [8]

7	10	12	4	8	7	3	8	5
12	11	9	6	1	1	13	10	4
4	5	8	8	7	7	3	2	3
8	13	1	7	17	3	6	5	5
5	1	17	10	4	7	2	0	8

i) Find sample mean, sample variance and sample standard deviation.
ii) Comment a value that measures the amount of variability relative to t value of mean.

23 TRIBHUVAN UNIVERSITY INSTITUTE OF ENGINEERING **Examination Control Division** 2071 Shawan	Exam.	New Back (2066 & Later Batch)	
	Level	BE	Full Marks 80
	Programme	BEL, BEX, BCT, B.Agri.	Pass Marks 32
	Year / Part	III / I	Time 3 hrs.

Subject: -Probability and Statistics (SH602).

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Necessary tables are attached herewith.*
- ✓ *Assume suitable data if necessary.*

1. Write difference between measure of central tendency and measure of dispersion and their importance. The following table represents the marks of 100 students. [6]

Marks	0-20	20-40	40-60	60-80	80-100
No. of Students	14	9	27	?	15

If the mode value is 58, find the missing frequencies and the mean of all 100 students.

2. Define multiplication law of probability for dependent and independent events with suitable examples. The independent probabilities that the three sections of a costing department will encounter a computer error 0.2, 0.3 and 0.1 per week respectively. What is the probability that there would be: [6]
   i) At least one computer error per week?
   ii) One and only one computer error per week?

3. Define Negative binomial distribution with an example. How does the negative binomial distribution differ from binomial distribution? [2+3]

4. A heavy machinery manufacturer has 3640 large generators in the field that are under warranty. If the probability is 1/1250 that any one will fail during the given year, find the probability: [5]
   i) That exactly 3 generators will fail during the given year?
   ii) That between 2 and 6 are fail during the given year?

5. Define the standard normal distribution. Give the condition for normal approximation of Poisson distribution. [2+3]

6. The breakdown voltage X of a randomly chosen diode of a particular type is known to be normally distributed with mean 40 volts and variance 2.25 volts. What is the probability that the breakdown voltage will be: [5]
   i) Between 39 and 42 volts
   ii) Between 40 and 43 volts
   iii) Less than 44 volts

OR

A probability density function is given by $f(x)=Ax(6-x)^2$ for $0<x<6$
   i) Find the value of A
   ii) Find the mean and variance of this distribution

7. Define sampling distribution of proportion with example. [4]

8. The monthly income of a particular group of retailer's follows a normal distribution with mean Rs.21,000.00 and standard deviation of Rs.9,487.00. A random sample of size 10 retailers was taken and the mean income is calculated. Find the probability that this sample lies between Rs.14,000.00 and Rs.27,000.00. [6]

9. Define partial correlation and multiple correlations with suitable examples. Write down properties of partial and multiple correlations. [5]

10. The following data given the number of twists required to break a certain kind of forged alloy bar and percentage of alloying element A present in the metal. [5]

Number of twists	41	49	69	65	40	50	56	52	31	28
Percentage of element A	10	12	14	15	13	12	13	14	13	12

   i) Fit the regression equation of number of twists on percentage of element A. Determine the predicted number of twist required to break an alloy when percentage of element is 20.

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11. The mean weight loss of n = 16 grinding balls after a certain length of time in mill slurry is 3.42 grams with a standard deviation of 0.68 gram. Construct a 99% confidence interval for the true mean weight loss of such grinding balls under the stated conditions. [4]

12. Four trained operators works on production of new product. The productivity of the operators are recorded as below: [5]

Operators	Production			
1	10	12	14	16
2	12	11	13	16
3	14	15	12	11
4	16	10	17	17

Using ANOVA, test whether the difference in average productivity due to the difference in operators are significant. Use $\alpha = 5\%$

OR

The following are the average weekly losses of worker hours due to accidents in 10 industrial plants before and after a certain safety program was put into operation:

Before	45	73	46	124	33	57	85	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Use the 0.05 level of significance to test whether the safety program is effective.

13. Define confidence level and significance level. A manufacturer claimed that at least 95% of the cables supplied to the ABC Company conformed to specifications. However, the production manager at ABC Company wasn't satisfied with the claim of the manufacturer. Hence, to test the claim, the manager examined a sample of 200 cables supplied last month and found that 228 cables as per the specifications. Can you conclude that the production manager is right to doubt on the claim of the manufacturer? (α=0.01) [5]

14. Define chi-square distribution. A book containing 500 pages was thoroughly checked. The distribution of number of error page was given below as: [5]

Number of errors	0	1	2	3	4	5
Number of pages	275	138	75	7	4	1

Using chi-square test of goodness of fit, verify whether the arrivals follow a Poisson distribution at 5% level of significance.

15. The sample of length of life of bulbs from two companies are given below: [8]

Length of Life (hours)	Company	
	A	B
500-600	10	3
600-700	7	8
700-800	5	15
800-900	8	10
900-1000	21	4
1000-1100	10	5
1100-1200	2	15
1200-1300	13	13
1300-1400	19	7
1400-1500	9	7
1500-1600	3	4
1600-1700	7	6
1700-1800	5	3
1800-1900	4	2
1900-2000	1	1

i) Calculate mean length of life of bulbs for Company A and Company B.
ii) Calculate sample standard deviation and sample variance for given data.
iii) Which Company's bulbs are more uniform?

BCT - III / I

22 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, B.Agri	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Probability and Statistic *(SH602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ ***Necessary tables are attached herewith.***
- ✓ *Assume suitable data if necessary.*

1. Two different sections of a statistics class take the same quiz and the scores are recorded below: [6]

   a) Find the range and standard deviation for each section
   b) What do the range values lead you to conclude about the variation in the two sections?
   c) Why is the range misleading in this case?
   d) What do the standard deviation values lead you to conclude about the variation in two sections?

Section 1	1	20	20	20	20	20	20	20	20	20	20
Section 2	2	3	4	5	6	14	15	16	17	18	19

2. Define dependent and independent events with suitable examples. The independent probabilities that the three sections of a costing department will encounter a computer error are 0.2, 0.3 and 0.1 per week respectively. What is the probability that there would be: [6]

   i) At least one computer error per week
   ii) One and only one computer error per week

3. Write the differences and similarities between Binominal and Negative Binominal Distribution. [2+3]

4. A quality control engineer inspects a random sample of 4 batteries from each lot of 24 car batteries that is ready to shipment. If such a lot contain six batteries with slight defects. What are the probabilities that the inspector's sample will contain: [5]

   i) None of the batteries with defect?
   ii) At least two of the batteries with defects?
   iii) At most three of the batteries with defect?

5. A random variable X has the following probability density function as: [5]

$$f(x)=\begin{cases} kx^3(4-x)^2, 0<x<1 \\ 0, \text{otherwise} \end{cases}$$

   Find the value of k, using this value of k find mean and variance of distribution.

6. The breakdown voltage X of a randomly chosen diode of a particular type is known to be normally distributed with mean 40 volts and variance 2.25 volts. What is the probability that the breakdown voltage will be: [5]

   i) Between 39 and 42 volts
   ii) Less than 44 volts
   iii) More than 43 volts

OR

The daily consumption of electric power in a certain city follow a gamma distribution with $\alpha = 2$ and $\beta = 3$. If the power plant of this city has daily capacity of 12 million kilowatt hours, what is the probability that this power supply will be inadequate on any given day?

7. State central limit theorem. An electrical firm manufactures light bulbs that have a length of life that is approximately normally distributed with mean equal to 800 hours and standard deviation of 4 hours. Find the probability that a random sample of 16 bulbs will have an average life of less than 12775 hours. [5]

8. What do you mean by sampling distribution of a sample mean and its standard Error? What would be the variance of sampling distribution of mean if sample is taken from finite population? [3+1]

9. Define partial and multiple correlation with suitable examples. Write down the properties of partial and multiple correlation. [5]

10. The following data gives the number of twists required to break a certain kind of forged alloy bar and percentage of alloying element A present in the metal. [5]

Number of twists	41	49	69	65	40	50	58	57	31	36
Percentage of element A	10	12	14	15	13	12	13	14	13	12

i) Fit the regression equation of number of twists on percentage of element A. Determine the predicted number of twists required to break an alloy when percentage of element is 20.

ii) Find 99% confidence interval for the regression coefficient (i.e.slope)

11. In a certain factory, there are two independent processes manufacturing the same item. The average weight in a sample of 250 items produced from one process is found to be 120 gram with a standard deviation of 12 gram, while the corresponding figures in a sample of 400 items from the other process are 124 and 14 respectively. Test whether the two mean weights differ significantly or not at 5 percent level of significance. [5]

12. Three trained operators work on production of new product. The productivity of the operators are recorded as below: [5]

Operators	Production			
1	10	12	14	16
2	12	11	13	16
3	14	15	12	11

Using ANOVA test whether the difference in average productivity due to the difference in operators are significant. Use $\alpha = 5\%$

OR

Define confidence level and significance level. A company claims that its light bulbs are superior to those of its main competitor. If a study showed that a sample of 40 of its bulbs has mean lifetime of 647 hours of continuous use with standard deviation of 27 hour. While a sample of 40 bulbs made by its main competitor had mean lifetime of 638 hours of continuous use with standard deviation of 31 hours. Does this substantiate claim at 1% level of significance?

13. Write down the steps for testing hypothesis on difference between two population proportions for the large sample size. [5]

14. 1072 students were classified according to their intelligence and economic conditions. Test whether there is any association between intelligence and economic condition. [6]

Economic Condition	Intelligence			
	Excellent	Good	Mediocre	Dull
Good	48	199	181	82
Not good	81	185	190	106

15. The sample of length of life of bulbs from two companies are given below: [8]

Length of life (hours)	Company	
	A	B
500-600	10	3
600-700	21	8
700-800	6	15
800-900	8	12
900-1000	21	4
1000-1100	10	5
1100-1200	2	15
1200-1300	12	13
1300-1400	19	7
1400-1500	9	7
1500-1600	3	4
1600-1700	7	6
1700-1800	5	3
1800-1900	4	2
1900-2000	1	3

i) Calculate mean length of life of bulbs for company A and company B.
ii) Calculate sample standard deviation and sample variance for given data.
iii) Which company's bulbs are more uniform?

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23 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2069 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, B.Agri.	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Probability and Statistics *(SH602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Necessary tables are attached herewith.*
- ✓ *Assume suitable data if necessary.*

1. The following are data on the breaking strength (in pounds) of 3 kinds of material: [2×3]

Material 1	144	181	200	187	169	171
Material 2	186	194	176	182	133	183
Material 3	197	165	180	198	175	164

   i) Calculate the average breaking strength and the median breaking strength for each material.
   ii) Calculate standard deviation and variance for each material.

2. Define independent and mutually exclusive events with an example. An assembly plant receives its voltage regulators from these three different suppliers, 60% from supplier A, 30% from supplier B and 10% from supplier C. It is also known that 95% of voltage regulators from A, 80% of these from B and 65% these from C perform according to specifications. What is the probability that: [2×3]

   i) Anyone voltage regulator received by the plant will perform according to specifications.
   ii) A voltage regulator that perform according to specification came from B and C.

3. Write difference between binominal distribution and negative binomial distribution with suitable examples. [2+2]

4. Among the 12 solar collectors on display at a trade show, 9 are flat-plate collectors and the others are concentrating collectors. If a person visiting the show randomly selects 6 of the solar collectors to check out, what is the probability that [2+2+2]

   i) Non of them will be flat-plate collectors.
   ii) At least 3 of them will be flat-plate collectors.
   iii) At most 2 of them will be concentrating collectors.

5. Define standard normal distribution. Write down its importance in engineering field. [4]

6. The breakdown voltage X of randomly chosen diode of a particular type is known to be normally distributed with mean 40 and standard deviation 1.5 volts. What is the probability that the breakdown voltage will be [6]

   i) Between 39 and 42 volts
   ii) At most 43 volts
   iii) At least 3.9 volts

OR

If a random variable X has a function

$$f(x) = \begin{cases} 2e^{-2x} & \text{for } x > 0 \\ 0 & \text{for } x \le 0 \end{cases}$$

Find (i) Verify that the function is probability density function
(ii) $P(1 < x < 3)$
(iii) Find mean and variance

7. What do you mean by the sampling distribution of sample proportion? [4]

8. A population consists of 5,6,9,12. Consider all possible samples of size two which can be drawn without replacement from this population. Find [2×3]

   i) Population mean and population standard deviation.
   ii) Mean of sampling distribution of mean.
   iii) Standard error of sampling distribution of mean.

9. The simple correlation coefficient between fertilizer (X_1), seeds (X_2) and productivity (X_3) are r_{12}=0.69, r_{13}=0.64 and r_{23}=0.85. Calculate the partial correlation $r_{12.3}$ and multiple correlations $R_{1.23}$. [4]

10. An article in Concrete Research presented data on compressive strength X and intrinsic permeability Y of various concrete mixes and cures. Summary quantities are n = 14, $\Sigma y = 572$, $\Sigma y^2 = 23{,}530$, $\Sigma x = 43$, $\Sigma x^2 = 157.42$ and $\Sigma xy = 1697.80$. Assume that the two variables are related according to the simple linear regression model. [6]

    i) Calculate the least squares estimates of the slope and intercept
    ii) Use the equation of the fitted line to predict what permeability would be observed when the compressive strength is x = 4.3.

11. The following are the breaking strength of three different brands of cables. [6]

Brand	Breaking strength					
A	40	30	50	60	30	-
B	60	40	55	65	-	-
C	60	50	70	65	75	40

Construction ANOVA table and test for the equality of the average breaking strength of cables at α=5%

OR

In a manufacturing company the new modern manager is in a belief that music enhances the productivity of workers. He made observations on 6 workers for a week and recorded the production before and after the music was installed. From the data given below, can you conclude that the productivity has indeed changed due to music? (α=1%)

Week without music	219	205	226	198	209	216
Week with music	235	186	240	203	221	205

12. A random sample of size 16 showed a mean of 52 with a standard deviation 4. Obtain 99% and 95% confidence limits population mean. [4]

13. From the following data can you conclude that there association between the purchase of brand and geographical region using Chi-square test at α=1%? [5]

	Region		
	Central	Eastern	Western
Purchase brand	40	55	45
Do not purchase brand	60	45	55

14. What are the steps in hypothesis testing? A study shows that 16 of 200 computers produced on one assembly need readjustment before shipping while same happens on 14 out of 300 produced. Test at 1% level of significance that the second assembly is superior than first one? [5]

15. Entrance scores of three engineering institutes is as follows: [1+2+2+3]

Institutes									
A	740	800	830	840	860	890	830	930	1070
B	655	775	825	978	989	1025	950	980	1100
C	850	825	749	870	565	978	925	950	1000

Calculate mean, standard deviation, coefficient of variation and answer the following

i) Which institute is good?
ii) Which institute is consistent/reliable?

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23 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, B.Agri.	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Probability and Statistics ***(SH 602)***

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ ***Necessary tables are attached herewith.***
- ✓ *Assume suitable data if necessary.*

1. Write any four characteristics of ideal measure of central tendency. For a group of 16 candidates, the mean and standard deviation were found be 20 and 5 respectively. Later it is discovered that the score 32 was measured as 23. Find the correct mean and correct standard deviation. [2+4]
2. Define dependent and independent events with examples. In a bolt factory, machines A, B and C manufacture 25%, 35% and 40% of the total respectively. Of their output 5, 4 and 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured from the machine-B? [2+4]
3. Write any two conditions that a function is a probability mass function. It is found that 10% of the items produced by a company are defective. Out of 8 items chosen, using binomial distribution, find the probability of: (i) no defective item (ii) at least one defective item. [2+2+2]
4. Define Poisson distribution. Write the limiting case of Poisson distribution as a Binomial distribution. [2+2]
5. In a continuous distribution, whose probability density function $f(x)=Kx(2-x)$, $0\le x\le 2=0$ otherwise. Find: [2+2+2]
   a) The value of K
   b) Mean of the distribution
   c) Variance of the distribution
6. State the importance of normal distribution in engineering field with an example. [4]
7. What do you mean by the sampling distribution of sample proportion? Distinguish between parameter and statistics. [1+3]
8. State the central limit theorem. A random sample of size 100 is taken from an infinite population having the mean 76 and variance 256. What is the probability that the sample mean will be between 75 and 78? [6]
9. The following table gives the age of the cars of a certain company and annual maintenance costs : [5]

Age of cars (Years):	2	4	6	8	10
Maintenance costs (Rs.000) :	10	15	22	32	46

Obtain the regression equation for cost related to age and also estimate the cost of maintenance for 10 yrs old car.

10. The simple correlation coefficient between temperature (X_1), corn yield (X_2) and rainfall (X_3) are $r_{12} = 0.59$, $r_{13} = 0.46$ and $r_{23} = 0.77$. Calculate the partial correlation coefficient r_{123} and multiple correlation $R_{1.23}$. [5]

11. The sample of 900 members has a mean of 3.4cms and standard deviation 2.61cms. If the population is normal and its mean is unknown, find 95% and 98% fiducial limits of true mean. [5]

12. A potential buyer of light bulbs bought 50 bulbs each of two brands. Upon testing these bulbs, he found that brand A had a mean life of 1282 hours with S.D. of 80 hours whereas the brand B had a mean life of 1208 hours with S.D. of 94 hours. Can the buyer be quite certain that the two brands do differ in quality? α = 10%. [5]

13. Describe the procedure of the test of significance of mean for sample. [4]

14. A soft drink is being bottled using two different filling machines. The standard deviation of the process for machine A and B was 0.010 and 0.015L respectively. 30 bottles were randomly sampled from each machine and the means were 2.04 and 2.07 L respectively. Can one conclude that both machines are filling the same volume of soft-drink? Test the hypothesis at $\alpha = 0.01$ level of significance. [6]

OR

Eight pots growing barley plants each were exposed to a high tension discharge, while nine similar pots were enclosed in an earthed wire cage. The number of tillers in each pot were as follows:

Caged	17	27	18	25	27	29	27	23	17
Electrified	16	16	20	16	20	17	15	21	

Test the hypothesis whether electrification exercises have any real effect on the tillering at $\alpha = 0.05$ level of significance.

15. The admission staff of a university, concerned with the success of the students it selects for admission wishes to compare the students' college performances with high school grades and test scores. The high school and college grade-point average (GPA) and student's average test (SAT) scores of 20 sampled students are follows: [2×4]

H.S. GPA	College GPA	SAT score	H.S. GPA	College GPA	SAT score
3.6	2.5	1100	3.4	3.6	1180
2.6	2.7	940	2.9	3.0	1010
2.7	2.2	950	3.9	4.0	1330
3.7	3.2	1160	3.2	3.5	1150
4.0	3.8	1340	2.1	2.5	940
3.5	3.6	1180	2.2	2.8	960
3.5	3.8	1260	3.4	3.4	1170
2.2	3.5	1040	3.6	3.0	1100
3.9	3.7	1310	2.6	1.9	860
4.0	3.9	1330	2.4	3.2	1070

a) Find, for each of the HS GPA, college GPA and SAT scores; The mean and standard deviation.

b) What is your conclusion about variability and uniformity from the analysis?

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24 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2067 Mangsir

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BEI., BEX, BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Probability and Statistics

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt any **Seven** questions selecting **Four** from **Group A** and **Three** from **Group B**.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ ***Necessary figures are attached herewith.***
- ✓ *Assume suitable data if necessary.*

Group A

1. a) Find the median, the lower and upper quartiles and the inter-quartile range for the following data: 4, 0, 5, 3, 6, 2, 5, 9, 5, 3. [6]

   b) Discuss the importance and limitation of graphical representation of data. [5]

2. a) An engineering system has two components, Let us define the following events: [6]

   A: First component is good; $\overline{A}$: First component is defective.

   B: Second component is good; $\overline{B}$: Second component is defective.

   Describe the following events in terms of A, $\overline{A}$, B and $\overline{B}$ if at least one of the components is good one is good and one is defective

   The test has produced the following result: P(A) = 0.8, P(B/A = 0.85, P(B/ $\overline{A}$) = 0.75 Determine the probability that

   i) The second component is good.
   ii) At least one of component is good.
   iii) Are they independent? Verify your answer.

   b) Define sample space, event and outcome with suitable example. [5]

3. a) Define the probability density function and it probability distribution. Give three engineering examples of discrete case. [5]

   b) Test for impurities commonly found in drinking water from private wells showed that 30% of all wells in a particular area have impurity A. If a random sample of 5 wells is selected from the large number of wells in the area, what is the probability that: [6]

   i) Exactly 3 will have impurity A?
   ii) At least 3?
   iii) Fewer than 3?

4. a) Define the hyper geometric distribution. Describe the conditions for Hyper geometric distribution. [5]

   b) From the DVDs manufactured by Sony, batches of DVDs are randomly selected and the number of defects x is found for each batch as given below. [6]

x	0	1	2	3	4
P(x)	0.502	0.385	0.089	0.011	0.001

   i) Identify the random variable x (discrete or continuous).
   ii) If in a batch it contains 5000CD, find the average number of defective DVDs

5. a) Define the normal distribution and standard normal distribution and its application in engineering field. [5]

b) The Precision Scientific Instrument Company manufactures thermometers that are supposed to give reading of 0°C at the freezing point of water. Tests on a large sample of these instruments reveal that at the freezing point of water, some thermometers give readings below 0° (denoted by negative numbers) and some give readings above 0° (denoted by positive numbers). Assume that the mean reading is 0°C and the standard deviation of the readings is 1.00°C. Also assume that the reading are normally distributed. If one thermometer is randomly selected, find the probability of randomly selecting one thermometer that reads (at the freezing point of water) [6]

i) The reading is less than 1.58° ii) Above – 1.23°.

6. a) Define the joint probability mass distribution, marginal probability mass function and conditional joint probability mass function. [5]

b) The given joint probability density function is $f_{xy}(x, y) = a(x + y)$, for $0 < x < 1$ and $1 < y < 2 = 0$, elsewhere [6]

i) Find the marginal function of X and Y.

ii) Find the probability for $(0.5 < x < 0.8$ and $Y > 1.5)$

Group B

7. a) What are estimator and estimates? Describe the criteria for a good estimator. [6]

b) A commission on crime is interested in the estimation of the proportion of crimes to firearms in an area with one of the highest crime rates in a country. The commission selects a random sample of 300 files of recently committed crimes in the area and determine that a firearm was reportedly used in 130 of them. Estimate 95% and 99% confidence of the true proportion p of all crimes committed in the area in which some type of firearm was reportedly used. [6]

8. a) What are assumptions for z- test? Describe the procedures of testing proportion? [6]

b) The Edison Electric Institute has published figures on the annual value of kilowatt hours consumed by various home appliances. It is claimed that a vacuum cleaner consumed an average of 46 kilowatt hours per year. If a random sample of 12 homes included in a planned study indicates that vacuum cleaner consumes an average of 42 kilowatt hours per year with a standard deviation of 11.9 kilowatt hours, does this suggest at the 0.05 level of significance that vacuum cleaners consumes, on the average, less than 46 kilowatt hours annually? Assume the population of kilowatt hours to be normal. [6]

9. a) Describe the errors of hypothesis. Explain the procedure for test of significance of pair data. [6]

b) According to Chemical Engineering an important property of fiber is its water absorbency. The average percent absorbency of 25 randomly selected pieces of cotton fiber was found to be 20 with a standard deviation of 1.25. A random sample of 25 pieces of acetate yielded an average percent of 12 with a standard deviation of 1.25. Is there strong evidence that the population mean percent absorbency for cotton fiber is significantly higher than the mean for acetate? Assume that the percent absorbency is approximately normally distributed and that the population variances in percent absorbency for the two fibers are the same. Use a significance level of 0.05. [6]

10. a) Write the properties of correlation coefficient and describe under what condition there exist only one regression line. [6]

b) On 13 April 1994, the following concentrations of pollutants were recorded at eight stations of the monitoring system for air pollution control located in the downtown area of Milan, Italy: [6]

	Station							
	Aquilcia	Cenisio	Juvara	Liguria	Marche	Senato	Verziere	Zavattari
NO_2 mg /m^3	130	130	115	120	135	142	90	116
CO_2 mg/m^3	2.9	4.4	3.6	4.1	3.3	5.7	4.8	7.3

i) Show the relationship between NO_2 and CO_2 by graphical method

ii) Compute the correlation coefficient between NO_2 and CO_2

iii) Explain the relationship between NO_2 and CO_2

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Kartik

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Graphics *(EX603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *Assume suitable data if necessary.*

1. Derive the Bresenham's decision parameter to draw a line moving from left to right and having negative slope. State the condition to identify you are in the second region of the ellipse using mid point algorithm. [8+2]
2. Write down the condition for point clipping. Find the clipped region in window of diagonal vertex (10,10) and (100,100) for line P_1 (5,120) and P_2 (80,7) using Liang-Barsky line clipping method. [2+8]
3. Find the transformation matrix the transforms that rectangle ABCD whose center is at (4,2) is reduced to half of its size, the center will remain same. The co-ordinate of ABCD are A(0,0), B(0,4), C(8,4) and D(8,0). Find Coordinate of new square. Also derive the transformation matrix to convert this rectangle to square. [10]
4. List out the properties of Bezier curve. What is order of continuity? Explain. [8]
5. Explain the significance of spatial orientation of a surface and polygon tables. Explain with example. [8]
6. Compare Z-buffer and A-Buffer algorithm. Also write algorithm to find visible surfaces using scan-line method. [10]
7. Explain the general illumination model. How this model is used for rendering by using gourpud shading. [7+7]
8. Write short notes on: [5+5]
   a) Raster scan display
   b) OpenGL

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01/003 02

34 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: Computer Graphics *(EX603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *Assume suitable data if necessary.*

1. Differentiate Random and Raster display technology. [4]
2. Compare between DDA and Bresenham's line drawing algorithm. Derive and write mid-point algorithm to draw ellipse. [10]
3. The reflection along the line y = x is equivalent to the reflection along the X-axis followed by counter clock wise rotation by α (alpha) Degree. Find the angle α. [10]
4. Write rotation matrix in clockwise direction with respect to x-axis, y-axis and z-axis. Rotate the object (0, 0, 0), (2, 3, 0), (5, 0, 4) about the rotation axis y =4. [3+7]
5. Write down properties of Bezier curve. Find equation of Bezier curve whose control points are P0(2,6), P1(6,8) and P2(9,12). Also find co-ordinate of point at u = 0.8. [10]
6. Explain boundary representation technique to represent the 3D object with suitable example. How can you find the spatial orientation of a surface? [8+2]
7. Explain z-buffer algorithm along with necessary steps needed to calculate the depth. What is its drawback? [10]
8. Define the terms: [10]

   i) Ambient light
   ii) Lambert cosine law
   iii) Diffuse reflection
   iv) Specular reflection.

   Also find equation for intensity of point by using Phong illumination model.
9. What is openGL? Explain callback function. [4+2]

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35 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Shawan

Exam.	[redacted]		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Graphics (EX603)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

1. Consider a raster scan system having 12 inch by 10 inch screen with a resolution of 100 pixels per inch in each direction. If the display controller of this system refreshes the screen at the rate of 50 frames per second, how many pixels could be accessed per second and what is the access time per pixel of the system? [4]
2. What is scan conversion? Derive the Bresenham's decision parameter to draw a line with negative slope and $|m|>1$. [2+8]
3. Given a clipping window A (10, 10), B (40,40), C(40,40) and D(10,40). Using cohen-sutherland line clipping algorithm find region code of each end points of lines P1P2, P3P4 and P5P6 where co-ordinates are P1 (5,15), P2(25,30), P3(15,15), P4(35,30), P5(5,8) and P6(40,15). Also find clipped lines using above parameters. [10]
4. Perform rotation of a line (10, 10, 10), (20, 20, 15) about Y-axis in clock wise direction by 90 degree. Explain about vector display. [6+4]
5. Derive the equation for cubic Bezier curve. Also write down its properties. [8]
6. Explain how the 3D object is represented using polygon table representation technique? Explain any one technique to calculate the spatial orientation of the individual surface component of 3D object. [4+4]
7. Describe scan line method to find visible lines with example. [10]
8. Under what condition(s) flat shading gives accurate rending? Mention the disadvantage of intensity interpolation technique and explain Phong shading with necessary mathematical calculation. Explain the diffuse reflection. [2+4+4]
9. Why GLUT is implemented in OpenGL? Explain OpenGL syntax to draw a parallelogram having vertices (0.0, 0.0), (1.0, 0.0), (1.5, 1.2) and (0.5,1.2). [2+4]

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34 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Graphics *(EX603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Differentiate Random and Raster display technology. [4]
2. Compare between DDA and Bresenham's line drawing algorithm. Derive and write mid-point algorithm to draw ellipse. [10]
3. The reflection along the line y = x is equivalent to the reflection along the X-axis followed by counter clock wise rotation by α (alpha) Degree. Find the angle α. [10]
4. Write rotation matrix in clockwise direction with respect to x-axis, y-axis and z-axis. Rotate the object (0, 0, 0), (2, 3, 0), (5, 0, 4) about the rotation axis y =4. [3+7]
5. Write down properties of Bezier curve. Find equation of Bezier curve whose control points are P0(2,6), P1(6,8) and P2(9,12). Also find co-ordinate of point at u = 0.8. [10]
6. Explain boundary representation technique to represent the 3D object with suitable example. How can you find the spatial orientation of a surface? [8+2]
7. Explain z-buffer algorithm along with necessary steps needed to calculate the depth. What is its drawback? [10]
8. Define the terms: [10]

   i) Ambient light
   ii) Lambert cosine law
   iii) Diffuse reflection
   iv) Specular reflection

   Also find equation for intensity of point by using Phong illumination model.
9. What is openGL? Explain callback function. [4+2

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34 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2070 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Graphics *(EX603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. How much time is spent scanning across each raw of pixels during screen refresh on a raster system with resolution 1024×768 and a refresh rate of 60 frames per second? [4]
2. Mention the disadvantages of DDA method. Write the complete Bresenham's line drawing algorithm and using midpoint circle drawing algorithm calculate the co-ordinate on the first quadrant of a circle having radius 6 and centre (20,10) [2+4+4]
3. State the conditions of point clipping. Perform clipping operation for the following using Liang Barskey line clipping algotithm: [2+6]

   Clipping window: (Xmin, Ymin) = (2,5) and (Xmin, Ymin) = (35,50)

   Line: (x1, y1) = (-2,2) and (x2,y2) = (45,40)
4. Define window and view port. Describe three dimension windows to view port transformation with matrix representation for each step. Derive oblique projection matrix with necessary assumptions. [1+4+5]
5. Define Hermite Interpolation in defining a curve. Use it to find the blending function of a parametric cubic curve in 2D graphics. [2+6]
6. Describe polygon, Vertex and Edge table of polygon. How these terms are important in computer graphics. [8]
7. Describe z-buffer method for visible surface detection in detail. State its limitation and recommended method that addresses it. [7+3]
8. Calculate the total intensity using phone secular reflection model by considering all type of light sources. [8]
9. Compare and Contract between Gouraud and Phong Shading Model. [8]
10. Write short notes on: [3×2]
    a) Call back function
    b) Open GL

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34 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Graphics ***(EX 603)***

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is the size of frame buffer required to store a SVGA with 24 bit true color video of 10 min without compression? [4]
2. Digitize the endpoint (10, 18), (15, 8) using Bresenham's algorithm. [8]
3. find the composite transformation matrix for reflection about a line $y = mx + c$. [8]
4. Find the new coordinates of a unit cube 90°-rotated about an axis defined by its endpoints A(2,1,0) and B(3,3,1). [8]
5. Why 3D graphics is more complex than 2D graphics? Explain with the help of viewing pipeline. [8]
6. Explain about parametric cubic curve? What is a Bezier Curve? Explain its properties. [3+3+2]
7. Explain how the geometric and attribute information of a three dimensional objects are stored for the object representation? What are the conditions for error free generation of polygon table? [5+3]
8. Differentiate between image space and object space methods of visible surface detection. Describe A-Buffer method of visible surface detection. [4+6]
9. Explain the Gourad shading for polygon-rendering and compare it with phong shading. [8+2]
10. Write short notes on: (any two) [4×2]
    a) Specular Reflection
    b) Midpoint circle decision parameter
    c) Application of OpenGL in Computer Graphics

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36 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Bhadra

Exam.		Regular / Back	
Level	BE	Full Marks	80
Programme	DBX, BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Computer Graphics

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Write Bresenham's line algorithm (you may assume $|m| < 1$). How the demerit of DDA algorithm is corrected in Bresenham's algorithm? [7+3]
2. Calculate all pixels of a circle in the first octant, proceeding to positive X axis direction. The radius = 30 and center at (10, 20). [10]
3. Perform scaling transformation to the triangle with vertices A (6, 9), B (10, 5), C (4, 3) with scaling factors $S_x = 3$ and $S_y = 2$. [Show the necessary transformation matrix] [10]
4. How do you perform shearing operations in 3-D in different directions? Discuss with necessary shear matrix. [10]
5. Formulate a matrix that converts 2-D scene described in world coordinates to viewing coordinates. [10]
6. What are the object space and image space method of hidden surface removal? Describe back face detection method of hidden surface removal. [4+6]
7. Discuss a constant intensity shading method. Mention the advantage of Phong shading over Gouraud shading. [7+3]
8. Write short notes on: (any two) [5+5]
   a) Raster display and vector display system
   b) 2-D viewing pipeline
   c) Plasma display

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36 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2067 Mangsir

Exam.		Regular / Back	
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Computer Graphics

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Write down the mid point circle algorithm. How symmetry of circle helps to reduce computation steps? Explain. [6+4]
2. Write down the Bresenham's line drawing algorithm for drawing straight line with consideration of all the slope categories. [10]
3. Which transformation converts a square to a rhombus? Obtain reflection matrix to reflect a point about the line $y = x$. [3+7]
4. A unit length cube with a diagonal passing through (0,0,0) and (1,1,1) is sheared with respect to yz plane with the shear constants = 2 in both directions. Obtain the coordinates of all the corners of the cube after shear. [10]
5. A 3-D scene is viewed from point (1,1,1) with camera orientation described by the orientation of three orthogonal vectors (1,1,1), (1,2,-3) and (-5,4,1). Obtain the transformation matrix to describe the scene with respect to camera orientation. [10]
6. What are object space and image space method of hidden surface removal? Describe one of the image space methods of hidden surface removal. [4+6]
7. Explain the Phong shading algorithm. Mention the advantages of Phong shading over Gouraud shading. [7+3]
8. Write short notes on: (any two) [5+5]
   a) Bezier Curve
   b) Resolution and Aspect ratio of a Monitor
   c) Flat panel Displays

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36 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2066 Magh

Exam.	Regular/Back		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Computer Graphics

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
- ✓ *<u>All</u> questions carry equal marks.*
- ✓ *Assume suitable data if necessary.*

1. Devise Bresenham's decision parameters for a straight line with negative slope with $|m| < 1$, applying left to right sampling. Assume that the line is in first quadrant.
2. Calculate all the pixels of a circle with radius = 10 and center at (50, 50) in the first octant starting from (50, 60) proceeding to positive x axis direction.
3. Justify with necessary matrix operations that the two successive rotations in 2-D is additive.
4. A 2 units length cube with a diagonal passing through (0,0,0) and (2,2,2) is spinning about an axis parallel to z-axis with angle 180 degree. Obtain the matrix involved for the operation.
5. Derive appropriate mathematical relation to transform 2-D scene (points) in world window to normalized view window.
6. Mention different types of projections. Derive oblique projection matrix with necessary assumptions.
7. Discuss Phong Illumination model with distance consideration.
8. Write short notes on:
   a) Backface Detection Algorithm
   b) Flat Panel Display

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36 PURBANCHAL UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Kartik

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Organization and Architecture *(CT603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *Assume suitable data if necessary.*

1. Differentiate between computer architecture and computer organization. Explain the computer functions with different cycles. [3+5]
2. Write a code for Y = (A+B)*(C+D)+G/E*F using three address, two address one address and zero address instruction format. [8]
3. Mention the different types of addressing mode and compare each other. [10]
4. Explain the address sequencer with the help of a block diagram. Explain about microinstruction format in detail. [5+5]
5. Define pipeline and explain its types. Describe different pipeline hazards with example. [4+6]
6. Draw the flowchart for restoring division method. [4]
7. Explain Booth multiplication algorithm. Multiply -6×12 using Booths algorithm. [4+6]
8. Draw the memory hierarchy. Explain Associative Cache Mapping with example. [2+6]
9. What are the different types of priority interrupt? Explain the communication between CPU and IOP with necessary block diagram. [4+6]
10. Explain about multiprocessor and multiprocessing in brief. [4]

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36 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Organization Architecture (CT603)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *Assume suitable data if necessary.*

1. What are the major differences between computer architecture and computer organization? What does the width of data bus and address bus represent in a system? Why is bus hierarchy required? [2+2+2]
2. Explain the general organization of register in CPU. Describe the operation of LD (load) instruction under various addressing modes with syntax. [6+4]
3. What are the different types of instructions? How can you perform X = (A+B) × (C/D) operation by using zero, one, two and three address instruction format. Assume A, B, C, D, X are memory address. [3+5]
4. What is address sequencing? Explain the selection of address for control memory with its block diagram. [3+7]
5. Explain the Arithmetic pipeline and instruction pipeline with example. [10]
6. Draw the flowchart for floating point Division. [4]
7. Design a booth multiplication algorithm hardware. Multiply 5 and -6 using booth multiplication algorithm. [4+4]
8. Explain cache organization. Explain the cache mapping techniques with example. [4+6]
9. Highlight the role of I/O interface in a computer system. Describe the drawbacks of programmed I/O and interrupt driven I/O and explain how DMA overcomes their drawbacks. [4+6]
10. How can multiprocessor be classified according to their memory organization? Explain. [4]

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37 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Shawan

Exam.	[illegible]		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Organization and Architecture *(CT603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What do you understand by Bus interconnection? What are the driving factors behind the need to design for performance? [2+4]

2. Explain Instruction Format with its types? Illustrate the code to evaluate to evaluate: Y = (A+B) * (C+D) using three address, two address, one address and zero address instruction formats. [2+6]

3. Describe the instruction cycle state diagram? Design a 2-Bit ALU that can perform addition, AND, OR operations. [3+3]

4. Explain the organization of a control memory. Discuss the microinstruction format with the help of a suitable example. [4+6]

5. Discuss about parallel processing? How parallel processing can be achieved in pipelining, explain it with time-space diagram for four segments pipeline having six tasks. [4+6]

6. Write down the detail algorithm of Booth Multiplication. Illustrate the multiplication of (9) and (-3) using 2's complement method. [5+5]

7. What is Memory Hierarchy and why it is formed in computer system? Explain the Direct cache memory mapping technique using organization diagram and appropriate example. [3+6]

8. What are the functions of I/O Module? What is the purpose of priority interrupt; explain priority interrupt types with key characteristics. [3+7]

9. Differentiate the following [4x3]

   a. RISC and CISC
   b. Restoring and Non-Restoring Division
   c. Crossbar Switch and Multistage Switching Network

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36 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Organization Architecture *(CT603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What are the major differences between computer architecture and computer organization? What does the width of data bus and address bus represent in a system? Why is bus hierarchy required? [2+2+2]
2. Explain the general organization of register in CPU. Describe the operation of LD (load) instruction under various addressing modes with syntax. [6+4]
3. What are the different types of instructions? How can you perform X = (A+B) × (C+D) operation by using zero, one, two and three address instruction format. Assume A, B, C, D, X are memory address. [3+5]
4. What is address sequencing? Explain the selection of address for control memory with its block diagram. [3+7]
5. Explain the Arithmetic pipeline and instruction pipeline with example. [10]
6. Draw the flowchart for floating point Division. [4]
7. Design a booth multiplication algorithm hardware. Multiply 5 and -6 using booth multiplication algorithm. [4+4]
8. Explain cache organization. Explain the cache mapping techniques with example. [4+6]
9. Highlight the role of I/O interface in a computer system. Describe the drawbacks of programmed I/O and interrupt driven I/O and explain how DMA overcomes their drawbacks. [4+6]
10. How can multiprocessor be classified according to their memory organization? Explain. [4]

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37 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2070 Ashad

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Organization and Architecture *(CT603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is performance balance and why is it required? Explain different elements of bus design. [6]
2. Define the addressing mode and explain the different types of addressing modes with example. [10]
3. What are the stages of ALU design? Explain with the example of 2-bit ALU performing addition, subtraction, OR and XOR. [8]
4. What are the differences between hardwired implementation and micro-programmed implementation of control unit? Explain with steps involved when you are designing micro-program control unit. [4+6]
5. What is instruction hazard in pipeline? What is the four segment instruction pipeline? Explain with example. [2+8]
6. How division operation can be performed? Explain with its hardware implementation. [10]
7. Draw a flowchart of floating point subtraction. [4]
8. What are the major differences between different cache mapping techniques? Suppose main memory has 32 blocks and Cache memory has 8 blocks when 10 blocks of main memory are used, show how mapping is performed in direct mapping technique. [6+2]
9. Differentiate between programmed I/O, interrupt-driven I/O and direct memory access (DMA). [10]
10. Explain the interprocessor synchronization with example. [4]

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01 /10

36 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2070 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Organization and Architecture *(CT603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Explain the interconnection of CPU with Memory and I/O devices along with different operations over them. [3+3]
2. Write down the Y = A/B+(C×D) + F(H/G) equation in three address, two address, one address and zero address instruction. [8]
3. Mention the different types of addressing modes. Compare each of them with algorithm as well as advantages and disadvantages. [10]
4. Differentiate between hardwired and micro-programmed control unit. How does a sequencing logic work in micro-programmed control unit to execute a micro-program? [4+6]
5. Explain the arithmetic pipeline and instruction pipeline with example. [10]
6. Explain the non-restoring division along with its algorithm, flowchart and example. [8]
7. Explain the Booth algorithm and multiply Y = 8×9 using Booth algorithms. [6]
8. Mention the characteristics of computer memory. Differentiate between associative mappings and set associative mapping with example. [3+5]
9. How does DMA overcome the problems of programmed I/O and interrupt-driven I/O techniques? Explain. [5]
10. Why IOP is use in I/O organization? Explain. [5]
11. Explain the characteristics of multiprocessors. [4]

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36 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: -Computer Organization and Architecture ***(CT 603)***

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Explain the functional view and four types of operations used in computer. [6]
2. What are most common fields in an instruction? How can you perform X=(E+F)*(G+H) operation by using zero, one, two and three address instruction format. Assume that E, F, G, H and X are memory addresses. [8]
3. Define addressing mode. Explain different types of addressing modes with example. [10]
4. Explain various fields in micro-instruction format with neat and clean block diagram. Describe how address of control memory is selected. [3+7]
5. What are the hazards in instruction pipelining? How can they be resolved? Explain. [10]
6. Explain Booth algorithm. Use the Booth algorithm to multiply 23(multiplicand) by –21(multiplier), where each number is represented using 6 bits. [8]
7. Explain floating point division algorithm. [6]
8. Explain cache read operation. What are the demerits of direct mapping technique used in cache design and describe in details any one of the mapping technique that solves these problems. [8]
9. Why input-output processor is needed in an input-output organization? Explain with block diagram. [10]
10. Define the multiprocessor and its characteristics. [4]

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42 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Baishakh

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Architecture and Design

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Write down the following equation in three addresses, two addresses, one address and zero address instruction. If necessary, use temporary location T to store intermediate result. Y = A + (B*C) + D. [8]
2. What are the different types of addressing modes? Compare each of them with algorithm as well as advantages and disadvantages. [8]
3. Differentiate between restoring division and non restoring division with example. [8]
4. What are the three types of control signals? Explain the key steps of hardware implementation of control unit. [3+7]
5. What do you mean by mapping process? Differentiate between direct, associative and set associative mapping. [2+8]
6. Explain the key characteristics of computer memory systems. [8]
7. Explain the input/output interface with example. [6]
8. Compare between program I/O, interrupt driven I/O and Direct Memory Access (DMA). [8]
9. What are the steps to configure the plug and play device? Explain. [6]
10. What are the main goals of the plug and play BIOS specification? Explain. [8]

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42 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2067 Ashadh

Exam.	Regular/Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Architecture and Design

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Write down the Y=AB÷ (F/G) +CD equation in three-address, two address, one address and zero address instruction. (8)
2. What are the three types of data manipulation instructions used in computer? Explain. (8)
3. Explain the Booth algorithm and its hardware implementation. Multiply the 6×7 using Booth algorithm. (4+4)
4. What do you mean by address sequencing? Explain the address sequencing capabilities required in a control memory. (3+5)
5. Why replacement algorithm is used when designing the cache? Explain with example. (8)
6. Why cache management is necessary in mapping process? Differentiate between direct mapping address structure and associative mapping address structure. (2+6)
7. What are the four types of I/O commands that an interface receive during the communication link between the processor and peripherals? Explain the I/O bus and interface modules. (4+4)
8. Mention the three possible configurations of DMA and compare them. (8)
9. Explain the PnP device configuration with example. (8)
10. Define the terms. (4×2=8)
    a) ISA
    b) PnP Post

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23 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Kartik

Exam.	Back/Back (Old Course) Back Batches		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Instrumentation II *(EX602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

1. a) "Microprocessors are indispensible tools in modern industrial instrumentation systems". As an engineer, provide a technical explanation including block diagrams to this statement by relying on observations from your case-study. [4]

   b) What benefit are obtained from a memory-mapped I/O design? Design an interface arrangement for 8085microprocessor to map output ports in address space 1000H to 2000H and input ports in address space 3000H to 4000H. [4]

2. a) Consider a double handshake scheme that allows data transfer from an input peripheral device to an 8085-microprocessor through an 8255-PPI. [5]

   i) List all control signals that get exchanged between the devices.
   ii) Draw a detailed timing diagram showing the exchange of control and data signals. Include the cause and effect arrows in your timing diagram.
   iii) With a neat sketch how the overall system diagram between the modules mentioned above.
   iv) Generate an appropriate control word based upon your drawing and derive the address of the control register of the 8255-PPI used in your design.

   b) List the control signals used by the ISA bus. Provide convincing arguments to justify the replacement of the ISA bus by the PCI bus. Calculate the bandwidth of a 64 bit PCI bus operating at 66-MHz. [3]

3. a) What are the criteria should be involved during the design of RS-232A in Simplex, Half Duplex and Full Duplex modes. [4]

   b) Explain the USB signals and associated bus states. Also mention the signal levels to achieve these bus states. [4]

4. a) Why do we need to digitize a signal? What are the errors associated with A/D or D/A converters? [5]

   b) What are the selection criteria for A/D or D/A converters? [2]

   c) To convert an analog signal into digital form, 8 bit ADC is used. The ADC has eight input channels, and channel four is used to capture the incoming analog signal. The address of the desired channel is sent through pins PB0, PB1 and PB2. After at least 50-nanoseconds, this address must be latched. The latching signal is sent using PB4. After another 2.5-microseconds, PB3 is used to initiate the conversion process. The completion of the process is signaled via PC5. The output latch of the ADC can be enabled through PB6, and digital data can be read through port A of 8255-PPI. [8]

i) Draw a circuit showing the interfacing of the ADC module, 8255-PPI and 8085 microprocessor on the basis of the connections described above.

ii) Draw the timing waveforms of all the control and data signals involved in the process.

iii) Provide a flowchart that depicts the ADC process.

iv) Derive port addresses from your circuit diagram and provide the control word.

5. a) In high-speed circuits, "ground" is a meaningless concept, the important question is, "what path does return current follow?" Justify the above statement with proper reasons and examples. [4]

b) Discuss the importance of an interface unit. What factors need to be accounted for while designing input and output interface units? [4]

6. a) Define impedance matching. What is the impact of impedance discontinuities? [2]

b) How do you reduce crosstalk when routing signal traces on a PCB? [4]

7. What are the basic principles of signal propagation and circuit layout for Routing Signal Traces which are predominant of effective circuit layout? [6]

8. Programs are to be read by humans. For programs to be useful, reliable and maintainable, you must make them readable and understandable. Good design and programming practices can make programs more readable. Explain in brief how you can make programs more readable. [8]

9. Answer the following questions with respect to your case study: [12]

i) What is techno-commercial feasibility of a system? Provide examples from your case-study experience.

ii) List the major technical drawbacks present in the existing MIS system that you witnessed at the industrial site.

iii) Give at least three feasible technical solutions to overcome the drawbacks that you witnessed. Show how your solution will offer higher reliability etc. Incorporate fault-tolerant design practices. Include block diagrams.

iv) If you had to present your design to the company's management team, what sort of question would you anticipate? Provide a list of at least five questions that would be asked from a management point of view. How would you cope with the questions, and how would you convince the team to accept your design?

v) Repeat part (d), but now you are trying to convince senior engineers. How will the question and answer session change compared to part (d)?

vi) Compare and contrast your design with the existing design in terms of the following metrics: cost/performance ratio, technical specifications (hardware & software) and design complexity (provide diagrams).

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22 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Shrawan

Exam.	[redacted]		
Level	BE	Full Marks	80
Programme	BEI., BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Instrumentation II *(EX602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

1. Draw and explain the block diagram of microprocessor based instrumentation system. Also list out advantages of implementing an MBI system. Explain briefly the concept of DMA. [4+2+2]
2. Assume that your group has decided to make a PC based instrumentation control system for automatic concrete purifying factory using an 8255 PPI card at base address 4000H in memory mapped I/O mode for controlling purpose. [1+1+2+2+4]
   a) List out the collected documents and components.
   b) List out the different signals you need to derive and or can be connected directly to your interfacing circuit.
   c) Draw minimum mapping circuits for the above system.
   d) What are the addresses capaired by your card? Generate the control word for the system.
   e) Write a program module to read ten set of raw data from port A and port B, add the data and store the result starting from address 4040H.
3. a) Describe the problem that occurs when you attempt to connect together two Rs232 devices that are both configured as DTE. Draw a diagram which shows how this problem can be resolved. [5]
   b) Explain USB protocols which should be followed during the USB design. [5]
4. What are characteristics of A/D or D/A converters? With necessary diagram explain the interfacing of 10 bit DAC with 8085 along with timing diagram. [2+4]
5. a) What is data logger? Explain the characteristics for a data logger. [5]
   b) Write the advantages and disadvantages of optical fiber communication. [3]
6. What are the principle of grounding? Mention how many configurations are available to provide the basic principle of grounding. [1+5]
7. a) What are the reasons for using low power design? [2]
   b) Write about ground bounce, cross talk, impedance matching and timing skew. [4]
8. Fault tolerance reduces possibility of dysfunction or damage from abnormal stresses and failure. It has three distinct areas; careful design, testable functions and redundant architecture. Explain how we can avoid many failures using these three approaches. [6]
9. IOE is planning to apply new software for its database management system. Suggest the best selection and purchase procedure? Explain in detail about good programming practice. [3+5]
10. What have you learned from case study? Draw the complete block diagram of the industrial process control involved in your case study. What are the critical factors affecting the production you have noticed in the visited industry and what measures can you suggest for the same? What problems you might face after implementing your suggested process control system. [12]

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23 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Instrumentation II *(EX602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. a) How do you select a microprocessor or a microcontroller for your project? [3]

   b) Explain the block diagram of a microprocessor based instrumentation system. What are the basic features of a microprocessor based instrumentation system? [5]

2. a) Write a short note on PCI Bus. [2]

   b) Interface a keyboard and a printer in mode 1. Port A is designed as input for keyboard with interrupt I/O port B is designed as output for printer with status check I/O. Draw the mapping circuit and write the control word and address map. [6]

3. a) Design a cable that has a USB connector at one end and an RS-422 connector at the other end. Assume the USB is connected to a laptop and the RS-422 connector is attached to a printer. Your design should include the following: [6]

   i) Technical names of the pins and wires involved in the design.
   ii) Intermediate chips to maintain voltage uniformity between the two standards.
   iii) Neat and labeled sketch of the wiring between the two standards.

   b) What is a USB interface chip? Why are they required? Compare and contrast USB device interface chips and USB host interface chips. [4]

4. a) Calculate the values of the LSB, MSB, resolution and full-scale output for an 8-bit DAC for the 0 to 10V range. [2]

   b) How can you design a DAC with 12 bit resolution with the 8085 microprocessor having 8 bits data lines? Explain with suitable block diagram. [6]

5. a) What are the essential components of data acquisition system? Explain with the help of block diagram. [4]

   b) Explain Bluetooth network topology in brief. What are the advantages of Bluetooth applications? [4]

6. a) What are the characteristics of a safety ground? [2]

   b) Describe different types of noise coupling mechanism in brief. How do you check their predominance in the circuit? [4]

7. A data logger receives signals from a Bluetooth scatternet. The scatternet consists of three piconets and within each piconet there are four bluetooth devices. The piconets communicate within themselves and amongst each other using the master/slave protocol. [10]

   a) Describe an analog transmission mechanism to capture the blue tooth signals by the data logger. Draw a complete system block diagram.
   b) Describe the mater/slave protocol that is present in blue tooth piconets and scatternets
   c) Draw the scatternet topology depicting the scenario maintained in the question. Make sure you adhere to the rules of the masters/slave protocol.

8. a) While designing an electronic instrument you should group circuits according to their characteristics to maintain the correct operation of each circuit. What are the considerations during grouping components and circuits and what is the impact of such grouping? [4]

   b) What are the factors that derive reliability of an electronic system? [2]

9. Compare and contrast the three traditional models of software development with respect to their strengths and weaknesses. Propose a fourth software development model that outperforms the classical methods and justify your choice in terms of reliability, maintainability, flexibility, portability and reusability. [4]

10. Draw the complete block diagram of industrial process control system involved in your case study. Explain why you want to implement this control system over existing one in terms of cost, manpower and plant automation. What problems you might face after implementating this control system. [12]

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24 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2069 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Instrumentation II *(EX602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Explain briefly the concept of DMA. Draw circuit Diagram of an interfacing circuit containing 4 KB ROM and 8 KB RAM. Assuming Base address in 4000H. You also need to draw write and read cycle timing diagram. [2+6]
2. In a microprocessor based system, an 8255A PPI card is used to interface a keyboard and a printer to the processor. The 8255A PPI is interfaced with the 8085 microprocessor in the system such that the base address of 8255 A PPI is 4044 H.
   a) What are the addresses captured by the card? [1]
   b) Draw the complete interfacing circuit of 8255A PPI with 8085 microprocessor for the given system. [3]
   c) If the printer is interfaced to port A and the keyboard is interfaced to port B of the PPI generate the control word to initialize the 8255A PPI with proper explanations. Both printer and keyboard use 8-bit parallel data transfer with handshaking. [2]
   d) Derive the control word to enable interrupt request to the microprocessor by port A of 8255A PPI in above system, with proper explanations. [2]
3. a) Compare the USB standards: USB 1.1 and USB 2.0 [3]
   b) Describe simplex, half duplex and full duplex operation using RS-232 port. [7]
4. What are types of errors present in a A/D or D/A converters? With necessary diagram explain the interfacing a ADC using interrupt. [3+5]
5. a) Explain different network topologies of Bluetooth device with appropriate diagrams. [4]
   b) What is a data logger? Explain the desirable characteristics for a data logger. [1+3]
6. Explain different types of Noise coupling Mechanism with concept of Pseudo impedance. [6]
7. What are the reasons for using low power? Mention the guidelines to be considered for low power design. [2+4]
8. A careful circuit layout not only makes the production of circuit boards easier but also makes them less error prone. What rules does a designer have to follow while routing signal tracks in PCBs in order to avoid the effects of impedance mismatch and crosstalk? [3+3]
9. What is fault tolerance in software? What do you mean by roll-back recovery and roll-forward recovery? Explain different types of bugs in software. [2+2+4]
10. a) What are the types of Microprocessor based system used in instrumentation system? How it makes more benefits in industry? [3]
    b) Explain detail about different processing plant which you have studied in case study. Also draw the block diagram for further improvement of these all plant and overall system. [9]

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24 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2069 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Instrumentation II *(EX602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

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10. a) What are the types of Microprocessor based system used in instrumentation system? How it makes more benefits in industry? [3]
    b) Explain detail about different processing plant which you have studied in case study. Also draw the block diagram for further improvement of these all plant and overall system. [9]

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41R TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Baishakh

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Microprocessor Based Instrumentation

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

1. Interface two 8K RAM chips and two 4K EPROM chips with 8086 so as to form a completely working system configuration. We know that, after reset, 8086 starts from address FFFF0H. Select the starting address of EPROM such that this address (FFFF0H) lies in it. The RAM address must start at 00000H. [10]
2. a) If the speeds of I/O devices do not match the speed of the microprocessor, what types of data transfer techniques are used? Describe them briefly with necessary block diagrams and control signals. [8]
   b) An 8255A PPI connected to 8085 has a system base address of 80H. [5]
      i) What are the addresses assigned for Port A, Port B, Port C and control register?
      ii) Write down the control word to initialize this card as follows: Port A mode 0 output, Port B handshake input, Port C_{upper} output and reaming pin of Port C_{lower} input.
      iii) For above case, write down bit set/reset control word to initialize Port B interrupt request.
3. Differentiate between synchronous and asynchronous data transmission. What is the time required for transmission of a character with one start bit, 7 data bits, one parity bit and one stop bit with 1200 baud? [4+4]
4. What are the criteria for selection of Analog to Digital converter for your design? [4]
5. a) An arc welder on the end of the robotic arm generators noise interference in the local embedded controller. The welder produces 120A at 12V. What could be the coupling mechanism for noise interference? How this can be minimized? [4]
   b) How would you protect against electrostatic discharge? [4]
6. a) Define crosstalk. How can reduce crosstalk when routing signal traces on a PCB. [6]
   b) List out the factors which you need to consider for high speed design. [3]
7. Discuss the prototyping model of software development with its merits and demerits. [8]
8. a) Discuss the advantages of digital signal transmission over analog signal transmission. [4]
   b) Draw the clear block diagram of data logger showing all necessary components. [4]
9. Write short notes on: [6×2]
   a) Static and Dynamic errors in Digital to Analog Converters
   b) Software selection and purchase

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24 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Instrumentation II ***(EX 602)***

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. a) One thing embedded real time systems have in common is that they include some type of processor. They range any where from a serial-program input device to a full-fledged PC on a chip or board. At some point, an engineer decided on the type of processor to use. How did he pick it? Are there any rational reasons for picking one over another? Or are all processor selections based on personal bias? And what are the situational factors imposing selection of a microprocessor or microcontroller for a design. Discuss at length. [7]

   b) Give a short introduction of ISA bus. [3]

2. You have to interface ADC with 8085 using 8255A ports. Interface a fan and a heater using opto couplers to derive the I/O devices. If the temperature is less than 10°C, turn on the heater and if the temperature is higher than 35°C, turn on the fan. Use port A of 8255 for transferring digital data output of ADC to the CPU and part C for control signals. Assume that an analog input is present at second input of the multiplexer and a clock input of suitable frequency is available for ADC. Also write an appropriate flow chart and algorithm to facilitate your design. Draw the diagram of your design. [8]

3. a) What is disaster recovery in software? How could it be implemented at your organization? [3]

   b) In the software developments process, proper planning is essential in delivering the finished product to the client. Equally it is important that bugs have to be removed from the product. Discuss in details about the nature of bugs in software development process. What are the preventive steps you would take to minimize introduction of the bugs? [6]

4. How stub discontinuity cause impedance mismatch. Also point out the causes of crosstalk. Explain in your own words with relevant figure. [4+2]

5. "Establishing requirement is the most difficult part of circuit design". While designing the electronic circuit, specify and explain the procedure of converting the requirements into design. [6]

6. a) Differentiate between USB 1.1 and USB 2.0. State briefly how USB 2.0 identifies itself with the interfacing unit and establishes communication protocol. Draw the necessary diagrams. [6]

   b) Explain the functions the DSR, DTR, RTS, CTS, TXD and RXD signals. [2]

7. Signals from three different transducers (A, B and C) located 100 meters away from a control room in a factory are very important to control stepper motors to give final tune to the products. The strength of these signals ranges from 10mV to 20mV and separated at 4KHz. Transducer A, B and C generate 6KHz, 10KHz and 14KHz signals

a) How do you want to route these signals to the control room? [2]

b) If your A/D converter do not have S/H hold circuits, what specification of S/H chip you select for your design? Discuss also the errors associate with the converter. [6]

8. a) Why protecting against ESD should be considered in design? [2]

b) Describe different types of noise coupling mechanism in brief and how do you check their predominance in the circuit? [4]

9. a) What is Bluetooth device? How does it transmit data using pico and scatter net? [3]

b) Draw the block diagram of a data logger and explain its operation in details. [4]

10. Recommend the changes that you deem necessary in the visited industry during your case study? Explain the reasons why management should implement these changes? Assume that you have a senior reporting Computer/Electronics engineering closely looking at work from the system development level, apart from convincing the management team at the visited industry to implement new system, you also need to convince the senior engineer technically so that your recommendation will be implemented. How do you want to achieve this technically? Debate on your technical design to replace the current system and also relate probable problems you might face after system implementation. [12]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Shawan

Exam.	[redacted]		
Level	BE	Full Marks	100
Programme	BEL, BEN, BCT, B.Agri	Pass Marks	[illegible]
Year / Part	III / I	Time	3 hrs.

Subject: Communication English (SH601)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

1. Edit the following text to make it error free. [5]

A woman husband had been seriously ill but finally the doctor announces that he would live. What do you mean? You told me that he couldn't last another two weeks, complained the wife. "Well, I'm going to cure him after all. Surely you're glad aren't you" replied the doctor. It puts me in kind of a trouble said the woman I've gone and sold his clothes to pay for the funeral.

2. Read the following text and interpret its meaning in your own language: [5]

Now mark another big difference between this natural slavery of man to nature and the unnatural slavery of man to man. Nature is kind to her slaves if she forces you to eat and drink, she makes eating and drinking so pleasant that when we can affect it we eat and drink too much. We must sleep or go mad, but then sleep is so pleasant that we have great difficulty in getting up in the morning.

3. Read the following text carefully, make notes and write a summary. [5+5]

Colonising space could be much more difficult than we imagine. Scientific studies suggest that children born in space might suffer permanent nervous-system damage unless exposed to Earth-like gravity at key points in their development. One difficulty could be learning how to walk. Young children born in space could have trouble walking on Earth because their nervous systems would have developed in the low-gravity environment of space. Even adults might have difficulty fully re-adjusting to life on Earth after prolonged periods of weightlessness.

Scientists are just beginning to discover the importance of gravity in the development of life. They are already aware that it has a serious effect on cell metabolism, brain development and DNA synthesis. For this reason pregnant women cannot go into space. Studies of 12 pregnant mice launched into space carrying some 250 foetuses at varying stages of which is a normal aspect of development, slowed down in space, as did cell reproduction. Without gravity the space-grown brains were smaller and had fewer nerve cells than normal mouse brains. How this would affect the functioning of the brain in an adult animal requires further study.

Another effect could be muscle wasting. This has already been observed in astronauts, although there is disagreement as to whether it is linked to the effects of gravity on the muscle cells or just the lack of muscle use. In any case, loss of muscle strength in space has so far proven to be temporary and there are no confirmed reports of any long-term illness in people returning from long periods in space.

Other studies have produced mixed findings. One study showed that laboratory rats reared in space could not figure out how to walk properly on Earth due to spinal cord damage suffered in space. This study also showed that newborn pups, which are born blind, need gravity in order to learn how to hold themselves upright. Other findings confirm that adult subjects, including humans, can fairly easily recover balance and navigational abilities that have been lost in space.

Clearly the importance of gravity in the development of human beings requires further study before individuals can be sent off to colonise space.

4. Answer any two of the following question. [10]
   a) How are cables constructed and used in suspension bridges? (Suspension Bridges)
   b) What do you mean by scientific attitude? Name some qualities of a scientist.
   c) How did she mother do the duties of a mother and citizen? (The mother of a Traitor)

5. Choose the best words to complete the following sentences. [5]
   a) He knew that he had a toothache while he ..... his teeth. (brushed, was brushing, had brushed)
   b) People dispersed as soon As they ..... and explosion heard, were hearing, had heard?
   c) You must respect others in order to ..... (respect, be respective, be respected)
   d) ..... by the police, the suspects put their hands up. (to be warned, as warned, having been warned)
   e) The minister along with his secretaries ..... constituted. (has, have)
   f) Some furniture ..... needed for the office. (is, are)
   g) If she ..... in your place, she would resign immediately. (was, had been, were)
   h) Anything ..... if the neighbors had not been there. (could happen, can happen, could have happened)
   i) I object ..... your coming late. (to, for, at)
   j) That woman has to care ..... three children. (to, for, by)

6. Arrange the following into APA and MLA styles of citations. [4]
   Author's name: Nunan, D.
   Book name: Understanding Language Classroom
   Publishing place: U.K
   Publisher: Prentice Hall
   Publishing date: 1989

7. As the secretary of Atul Engineering Consultancy Services, draft a notice for its 6th meeting along with 3 agenda. [5]

8. I imagine that you are working on suspension bridge construction project. Write the first monthly progress report of the project in a memo format. [6]

9. Write a short research article on the importance of internet to the engineering students. [10]

10. Imagine that you are asked to write a proposal on the construction of a water storage tank in a remote village. Write the following parts of the proposal. [10]
    Abstract, statement of the problem, objectives.

11. Suppose you are the chief Executives Engineer of a project related to the construction of a road in a remote part of Nepal and the project is to be completed very soon. Write abstract, introduction, methodology and finding of the reports. [10]

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27 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, B. Agri.	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Communication English *(SH601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Edit the following: [5]
Two pastors are standing by the side of a road holding up a sign that reads. The end is near turn around now before its too late! A passing driver yells, "you guys are nuts!" and speed past them. From around the curve, they hear screeching tyres- then a big splash. One of the pastors says to the other, do you think we should just put up a sign that says Bridge broken instead?

2. Study the following paragraph carefully and interpret it in your own words: [5]
The prevention of free inquiry is unavoidable so long as the purpose of education is to produce belief rather than thought to compel the young to hold positive opinions on doubtful matters rather than to let them see the doubtfulness and be encouraged to independance of mind. Education ought to foster the wish for truth, not the conviction that some particular creed is the truth.

3. Study the following text carefully, prepare notes and convert it into summary: [5+5]

One day in 2003, while on her morning walk in the park, Valavolkar felt a shape pain in her left shoulder. The pain soon subsided and she decided to go about her chores.

But a few hours later, the waves of pain returned when she was out walking again, this time to see the neighbourhood dentist about a cavity. It was much than in the worse morning. Overwhelmed with nausea, dizziness and shoulder pain that grew more intense with every step she took, she felt too weak to move. Anyhow, her husband and son being away at work, she assumed it was spondy litis and got in touch with a family friend, an orthopedic doctor, who insisted she see a heart specialist immediately.

At workhardt hospital soon afterwards, it became clear to the medics that she was having a myocardial infarction, a heart attack caused by the blockages- in Valavalkar's case of three blood vessels to the heart. One of them, a key artery, had a 95 percent blockage. An angioplasty was performed and a stent inserted to open up the blockage. Her medical care had been so swift, however, that there was no serious damage to the heart muscle.

Since then she hadn't been without trouble, but a cardiac rehab programe she entered in 2006 has helped her lead a normal life. "I feel fine now," Valvakar says, looking back. "Periodic check ups are essential and fortunately for me, these have revealed no problems. I am very active now. I even counsel other heart patients to help them stay positive."

"Women have different risk factors for cardiac disease than men, but there is such little awareness, " says Dr.Vanita Arora cardiac electrophysiologist and associate director at the Max Health Care Superspeciality Hospital in New Delhi.

4. Answer any two of the following questions: [5+5]
   a) Point out weaknesses of steam boilers and suggest any other better option of source of energy in context of Nepal. Tell why you think that could be the better option. (Steam Boilers)
   b) In recent years we Nepalese have seen colorful advertisements in newspapers about multi-storeyed apartments from different housing companies. In relation to this, talk about the suitability of the text "Piles for Foundations."
   c) Describe the various features that contribute to wisdom with reference to the text "Knowledge and Wisdom".

5. Fill up the following blank spaces selecting the correct words from the brackets: [0.5×10]

   a. He, along with his teachers, ...playing. (is, are)

   b. The principal and accountant.....on leave. (is, are)

   c. It .....a long time since he telephoned me. (is, has been)

   d. It's high time he .....the job. (got, has got)

   e. Had it not been a hot day, we .....a lot. (had worked, would have worked)

   f. Should that happen, I .....the job. (should quit, will quit)

   g. I'll stand .....you whatever happens. (for, by)

   h. The project is running .....financial difficulties. (with, into)

   i. The passive voice of "I remember him teaching me algebra" is ..... (I remember being taught algebra/I remember to being taught algebra by him.)

   j. The passive voice of "I saw him crossing the road" is ..... (He was seen crossing the road by me/He was seen to be crossing the road.)

6. Convert the following APA style into MLA and MLA into APA: [4]

   a) Santos, Richard. "Tax break?" The New Republic. 12 July. 1998: 24-40
   b) Scotto, P.Censorship, Reading and Interpretation. (2011) Studies in American Obfuscation 61-70.
   c) Fetler, Jane. "Critical People Cause Office Fireworks" (2010, June 4). The Providence Journal, P.A1.
   d) Prepare in text citation for:
      Wang, P. (1999, July) Fund Watch. Money, PP.49-54.

7. Assume that you have been appointed secretary of a committee comprising management, staff and workers representatives to advise the company to produce a handbook containing information about conditions of service, rules and regulations of fringe benefits and other related matters. Write a notice to call a meeting to discuss above matters. [5]

8. Suppose you are the chief consultant of Road Expansion Project being launched in the capital city Kathmandu. Write the second quarterly progress report in memo style. [6]

9. Write a brief research article on advancements made in the last decade in your field of engineering. [10]

10. Most communities do not have a place for scientists and citizens to meet to discuss important issues. You have a way to meet the needs of citizens who lack access to scientific expertise by bringing together scientists and non scientists to identify, discuss and resolve issues of public concern. Therefore as a matchmaker for groups and resources write a proposal. Include an introduction stating the problem and its significance. Discuss the proposed outcome and include a time table. [10]

11. Imagine that Government of Nepal has formed a committee under your chairmanship for the purpose of studying the effect of noise pollution in the industrialized towns in Nepal. Prepare only the title page, abstract, table of contents and recommendations sections of the report that you are going to submit shortly. [10]

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24 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2070 Chaitra

Exam.	Old Back (2065 & Earlier Batch)		
Level	BE	Full Marks	40
Programme	BEL, BEX, BCT	Pass Marks	16
Year / Part	III / I	Time	1½ hrs.

Subject: - Communication II (English) ***(EG604SH)***

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Transform the following sentences as indicated in the brackets: [4]
   a) Sunita is different from her elder sister (AmE)
   b) Sit down. (Very polite English)
   c) People believe that the leaders will sign the agreement. (Impersonal English)
   d) The meeting will commence soon. (Informal English)
2. Answer any two of the following questions: [8]
   a) How is 'beauty' losing its charm day by day? (Beauty)
   b) Why should a technician be wise? (Knowledge and Wisdom)
   c) "Customs have a great impact on our life". Justify this with reference to the text 'customs'.(Customs)
3. Write a description of the processes involved in getting a document printed out in a lap-top. [4]
4. Prepare a fifteen-minutes' technical talk on the problem of noise pollution in your own town. [8]
5. Imagine that you are the secretary of a social organization and the fifth meeting of the same organization has been held recently. Write minutes of the recent meeting. [6]
6. Suppose you have conducted a research on the effect of recent earthquake in Nepal. Write abstract, methodology, conclusions and recommendations of your report. [10]

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21 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, B. Agri.	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Communication English *(SH 601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *Assume suitable data if necessary.*

1. After taking notes, write a summary of the following passage. [5+5]

Since it is essential to secure rapid and complete combustion in the cylinder of an internal combustion engine, the fuel and air mixture must be thoroughly mixed; and further, it must be in the correct proportions for all running conditions of the engine. This is accomplished by means of a device called a carburettor. In this carburettor, a stream of air blown over a jet mixes intimately with a spray of petrol drawn out of it. The jet is inserted into a choke or venturi in the intake manifold, and is supplied with petrol at atmospheric pressure.

During the suction stroke of the piston, the pressure in the intake manifold is below atmospheric, and air is induced through the intake and over the jet. *As there is a further drop* in pressure at the venturi, the pressure difference produced is large enough to draw petrol up out of the jet and atomise it. The level of the petrol in the jet is kept constant by the float and needle valve in the float chamber, which acts as a reservoir for the fuel. Above the venturi there is a throttle valve operated by the accelerator pedal, which controls the amount of mixture admitted to the cylinder.

However, this simple form of single-jet carburettor will not give correct mixture strength for all engine speeds. The chief difficulty encountered is that, at high running speeds, the amount of petrol taken up at the jet will increase faster than the increase in air-flow. Therefore a carburettor set to give correct mixtures at low speed will give a progressively richer mixture as the speed increases. To compensate for this, a second jet is provided, fed from a well open to the atmosphere and supplied with petrol from the float chamber. *Owing to the fact that this compensating jet is larger* than the main jet, it can supply petrol at a quicker rate than the main jet until the well is emptied. As the speed is increased, more and more of the petrol required is drawn from the main jet. The compensator jet can now supply only as much petrol as can pass through the small compensator orifice in the float chamber.

Another problem to be solved is that of starting. In order to obtain the rich mixture required for starting, the throttle must be almost closed. *As the air velocity is then very low* in the venturi, insufficient petrol is drawn out of the jet. This difficulty is overcome by the provision of an idler jet in the wall of the intake manifold near the throttle valve. This jet will only function when the throttle is nearly closed. When it is opened for faster running, the suction round the edge of the throttle decreases, and the idler automatically ceases to act.

2. Answer the following questions briefly: (any three) [3×5]

   a) What is the importance of reading books in our life? [Of studies]

   b) Write a summary of the text " The mother of a Traitor". [The mother of a Traitor]

   c) Describe the importance of science with reference to the next 'The scientific Attitude'. [The scientific Attitude]

   d) What are the factors responsible for failure in successful communication.

3. Choose the correct words from the brackets: [0.5×10]

   a) Either you or I ..... supposed to do it. (are, am)
   b) The government .....decided to increase the salary of their civil servants. (have, has)
   c) The teacher said that we .....mortal. (are, were)
   d) She says that she .....more food. (wants, wanted)
   e) This notice.....altered. (has been, have been)
   f) A lot of the work .....by the students. (is being done, are being done)
   g) If I had enough money, I.....this car. (would have bought, would buy)
   h) Unless you.....hard, you can't pass the exam. (work, don't work)
   i) He died.....T.B last year. (with, of)
   j) She always takes.....notes in her class. (up, down)

4. Transform the following references from APA style to MLA style: [4]

   a) Perkin, H.C. (1975). Air Pollution. McGraw Hill: NewDelhi.
   b) Hall, Dauglas. (1989). Digital Circuits and Systems. Macmillan: Newyork.
   c) Morgan, J.H. (1960). Cathodic Protection. Macmillan: Newyork.
   d) Slabough, W.H. (1954). Mechanism of Filiform Corrosion. Oxford University Press: USA.

5. Write a short research article on the effect of noise pollution in urban areas in Nepal in about 300 words. [10]

6. Edit the following passage which contains a good many errors. [5]

   Aristotle the tutor of Alexander the Great was born in Stagira in Macedonia in 300 BC. Together with Plato, he is regarded as one of greatest philosophers the world knew. Aristotle was a true academic, concerned for Physics, Astronomy, Rhetoric, Literature, Political Science and History. His teachings has laid the foundation for modern scientific thought.

7. Suppose you are the secretary of a newly formed committee of Public Health Care Society. Write the minutes of the first meeting held recently inverting the agenda. [5]

8. A large number of deaths are caused by earthquakes. To minimize the loss of lives you want to do a study. Write a brief proposal to an organization sticking on objectives, procedure and rationale. [8]

9. The Minister for Road and Transport is concerned about the rapid increase in the number of road accidents on the highways. As a newly formed commission chairman, write a brief formal report investigating the causes and suggesting measures to control the road accident. [10]

10. Write a monthly progress report to be submitted to the Cheif Engineer, Department of Roads on the construction of a Bagmati Bridge near Thapathali. [8]

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25 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Baishakh

Exam.	Regular / Back		
Level	BE	Full Marks	40
Programme	BEL, BEX, BCT	Pass Marks	16
Year / Part	III / I	Time	1½ hrs.

Subject: - Communication II (English)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Transform the following sentences as indicated in the brackets: [4]
   a) I've got a handy lap-top. (AmE)
   b) Could you please lend me your car for an hour? (Informal English)
   c) It's believed that insomniacs are mentally ill. (Personal English)
   d) Open the door. (Polite English)
2. Answer any two of the following questions: [8]
   a) How can you say that beauty is a form of power? (Beauty)
   b) 'Mere knowledge without wisdom makes education futile'. Justify this. (Knowledge and Wisdom)
   c) Write the description of the city under attack. (The mother of a Traitor)
3. Write a description of landscape view of the most enchanting place you have ever visited. [4]
4. Draft a note of a twenty - minutes' technical talk on the necessities of preventive measures for the devastating earthquake in Nepal. [8]
5. Assuming that you are the secretary of a social organization, write a notice including four item agenda for the eighth meeting to be held shortly. [6]
6. Imagine that you have carried out a research study on the causes and consequences of deforestation in the hilly regions of Nepal. Write title page, acknowledgements, abstract and recommendation parts of your report. [10]

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INSTITUTE OF ENGINEERING
Examination Control Division
2068 Baishakh

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Microprocessor Based Instrumentation

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Interface two 8K RAM chips and two 4K EPROM chips with 8086 so as to form a completely working system configuration. We know that, after reset, 8086 starts from address FFFF0H. Select the starting address of EPROM such that this address (FFFF0H) lies in it. The RAM address must start at 00000H. [10]
2. a) If the speeds of I/O devices do not match the speed of the microprocessor, what types of data transfer techniques are used? Describe them briefly with necessary block diagrams and control signals. [8]
   b) An 8255A PPI connected to 8085 has a system base address of 80H. [5]
      i) What are the addresses assigned for Port A, Port B, Port C and control register?
      ii) Write down the control word to initialize this card as follows: Port A mode 0 output, Port B handshake input, Port C_{upper} output and reaming pin of Port C_{lower} input.
      iii) For above case, write down bit set/reset control word to initialize Port B interrupt request.
3. Differentiate between synchronous and asynchronous data transmission. What is the time required for transmission of a character with one start bit, 7 data bits, one parity bit and one stop bit with 1200 baud? [4+4]
4. What are the criteria for selection of Analog to Digital converter for your design? [4]
5. a) An arc welder on the end of the robotic arm generators noise interference in the local embedded controller. The welder produces 120A at 12V. What could be the coupling mechanism for noise interference? How this can be minimized? [4]
   b) How would you protect against electrostatic discharge? [4]
6. a) Define crosstalk. How can reduce crosstalk when routing signal traces on a PCB. [6]
   b) List out the factors which you need to consider for high speed design. [3]
7. Discuss the prototyping model of software development with its merits and demerits. [8]
8. a) Discuss the advantages of digital signal transmission over analog signal transmission. [4]
   b) Draw the clear block diagram of data logger showing all necessary components. [4]
9. Write short notes on: [6×2]
   a) Static and Dynamic errors in Digital to Analog Converters
   b) Software selection and purchase

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45 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Data Communication *(CT602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Describe the Transmission Impairments of Data Communication system with suitable examples. [6]
2. Define stable and unstable systems. Test the stability of the LTI systems whose impulse responses are given as (i) $h(t) = e^{3t}u(t)$ (ii) $h(t) = e^{-3t}u(t)$ [2+3+3]
3. Distinguish between energy and power signal with an example. Justify whether a signal $x(t) = e^{-a|t|}.u(t)(a > 0)$ is energy or power signal. [4+4]
4. State and explain Shannon-Hartley channel capacity theorem. Briefly discuss about the measures that are used to characterize the performance of a channel. [4+4]
5. Encode the Bit Stream 10110001110 using the following scheme. [10]
   a) RZ
   b) NRZ-I
   c) NRZ-L
   d) AMI
   e) Manchester
6. What do you mean by multiplexing? Explain about working mechanism of FDM and TDM. [2+3+3]
7. Differentiate between circuit switching and packet switching with suitable diagram. [6]
8. What are block codes? The generator matrix for a (6,3) block code is shown below. Obtain all code words. [2+8]

$$G = \left[\begin{array}{cccccc} 1 & 0 & 0 & : & 1 & 1 \\ 0 & 1 & 0 & : & 1 & 1 \\ 0 & 0 & 1 & : & 1 & 0 \end{array}\right]$$

9. What are Hamming codes? Write the properties of Hamming codes. Visualize a 3-bit code words as code vector. [2+4+4]
10. A message source generates 8 symbols with the following probabilities: [6]

$P(X_1) = 1/2$, $P(X_2) = 1/4$, $P(X_3) = 1/8$, $P(X_4) = 1/16$, $P(X_5) = 1/32$, $P(X_6) = 1/64$

$P(X_7) = 1/128$ and $P(X_8) = 1/128$

Encode the message using Huffman code.

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45 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Kartik

Exam.	New Back (2068 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Data Communication *(CT693)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

1. Differentiate between causal and anticausal signals with examples. Determine the power and energy for a continuous time signal of $x(t) = e^{-2t}u(t)(t \geq 0)$ [6+4]
2. Define periodic and non-periodic signals. Determine if the following systems are linear, time-invariant, stable and memoryless. [2+3+3]
   a) $y(t) = [1 - e^{-t}][U(t)]$ where U(t) is the continuous-time unit step function
   b) $y[k] = \sin(x[k-4])$
3. Define LTI system and impulse response. For the given signal $x(t) = e^{-at}u(t)(a > 0)$, find and plot the magnitude and phase spectra. [2+2+6]
4. Briefly discuss about the measures used to characterize the performance of a channel. State Nyquist's and Shannon's channel capacity formula. [2+2]
5. Define Throughput and Latency. Explain about different types of propagation. [3+3]
6. Design (a) RZ, (b) NRZ-L (c) NRZ-I (d) AMI waveforms for the data sequences of 1110001100110. [10]
7. Define multiplexing and list out its applications. Draw block diagram of Frequency Hopping Spread Spectrum transmitter and receiver and explain briefly. [4+6]
8. Differentiate between datagram switching and virtual circuit switching technique. Discuss packet switching taking example of X.25 protocol in detail. [5+5]
9. Show the application of hamming distance with suitable example. [4]
10. Write short notes on: [3+2]
    i) Linear block coding
    ii) Huffman loading

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45. TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

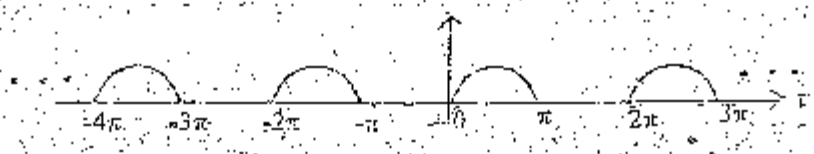
Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Data Communication *(CT602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

12.0

1. Define noise. Briefly discuss the types of noise. Define thermal noise power density; calculate the thermal noise power density in Watts/Hz at a temperature of 17°C, the Boltzmann's constant is 1.38×10^{-23} J/K. What is delay distortion and how can it be corrected? Why is digital transmission preferred over analog transmission? [4+2+2]
2. Define energy and power signal. Check the signal $x(t) = u(t)$ and $x(t) = \delta(t)$ is Energy or Power type. [1+4]
3. Define Linear, Stable, Time Invariant and Causal system with suitable examples. [4]
4. Find the Fourier series representation of the half-wave rectified Sine wave. [4]



5. Find the Fourier transform of the signal $x(t) = e^{-a|t|}$, where $(0 < a < \infty)$ is real-valued and $|t|$ denotes the absolute value of (t). Define the terms linear time-invariant (LTI) systems and impulse response. [4+2]
6. Compare the transmission characteristics and performance (frequency range, bandwidth, security, flexibility, interference, connectivity) of Optical fiber cable and Satellite transmission. [6]
7. Given a channel with an intended capacity of 40 Mbps. The bandwidth of the channel is 6 MHz. What signal-to-noise ratio is required in order to achieve this capacity? Also find number of bits/sample if channel becomes noiseless. [3+2]
8. Explain the working of Pulse Code Modulation (PCM). Draw AMI and Manchester encoding for the sequence [0 1 1 0 1 0 0 0 0 1]. [4+3+3]
9. Define multiplexing. Explain the working mechanism of WDM. Differentiate between synchronous and statistical TDM. How is spread spectrum utilized in CDMA? What are the advantages and disadvantages of CDMA? [2+2+2+2+2]
10. How does ATM differ from frame relay? What are the advantages and disadvantages of ATM compared to frame relay? [2+3]
11. Why is source coding necessary? Differentiate between fixed length codes and variable length codes. What is the purpose of Huffman's coding algorithm? Explain the general working principle of the Huffman coding algorithm. [1+1+1+4]
12. Define Dataword and Codeword with suitable example. List the error detection and correction coding techniques with their application case. [2+4]
13. Discuss the concept of redundancy in error detection and correction. Define Hamming distance? Differentiate between linear block codes and cyclic codes. [1+1+3]

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INSTITUTE OF ENGINEERING
Examination Control Division
2071 Shawan

Exam.	[illegible]		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Data Communication *(CT602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
- ✓ *The figures in the margin indicate <u>Full Marks</u>.*
- ✓ *Assume suitable data if necessary.*

1. Explain digital communication system with general block diagram. Explain the advantages of digital communication system over analog communication system. [6+2]
2. Explain the basic properties of systems with examples. [8]
3. Define unit impulse and unit step function. Obtain the Fourier transform of a single sided exponential function $e^{-at}u(t)$. Also draw the spectrum. [2+5+2]
4. Compare guided and unguided transmission media. Calculate the channel capacity having bandwidth and SNR of 6 kHz and 6 db respectively. [5+3]
5. Define modulation. Why is it necessary? Encode the bitstream 1010111000011 using NRZ, RZ, AMI and Manchester coding. [4+4]
6. Explain Quadrature Amplitude Modulation (QAM) with transmitter and receiver block diagram. [8]
7. What are the differences between multiplexing and multiple access? Define Time Division multiplexing (TDM) and explain it briefly. [3+5]
8. Define switching. Compare circuit and packet switching. Draw the X.25 layers and data formats. [7]
9. Define Information, Entropy and Minimum Hamming Distance with examples. [2+2+2]
10. Define cyclic code. Explain the procedure for determining code vector for linear block code. [3+5]

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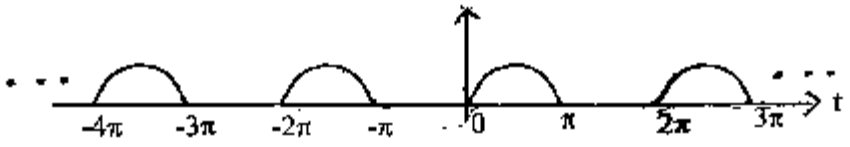
45 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / 1	Time	3 hrs.

Subject: - Data Communication *(CT602)*

- ✓ Candidates are required to give their answers in their own words **as far** as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

1. Define noise. Briefly discuss the types of noise. Define thermal noise power density; calculate the thermal noise power density in Watts/Hz at a temperature of 17°C, the Boltzmann's constant is 1.38×10^{-23} J/K. What is delay distortion and how can it be corrected? Why is digital transmission preferred over analog transmission? [4+2+2]
2. Define energy and power signal. Check the signal $x(t) = u(t)$ and $x(t) = \delta(t)$ is Energy or Power type. [1+4]
3. Define Linear, Stable, Time Invariant and Causal system with suitable examples. [4]
4. Find the Fourier-series representation of the half-wave rectified Sine wave. [4]



5. Find the Fourier transform of the signal $x(t) = e^{-a|t|}$, where $(0 < a < \infty)$ is real-valued and $|t|$ denotes the absolute value of (t). Define the terms linear time-invariant (LTI) systems and impulse response. [4+2]
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8. Explain the working of Pulse Code Modulation (PCM). Draw AMI and Manchester encoding for the sequence [0 1 1 0 1 0 0 0 1]. [4+3+3]
9. Define multiplexing. Explain the working mechanism of WDM. Differentiate between synchronous and statistical TDM. How is spread spectrum utilized in CDMA? What are the advantages and disadvantages of CDMA? [2+2+2+2+2]
10. How does ATM differ from frame relay? What are the advantages and disadvantages of ATM compared to frame relay? [2+3]
11. Why is source coding necessary? Differentiate between fixed length codes and variable length codes. What is the purpose of Huffman's coding algorithm? Explain the general working principle of the Huffman coding algorithm. [1+1+1+3]
12. Define Dataword and Codeword with suitable example. List the error detection and correction coding techniques with their application case. [2+4]
13. Discuss the concept of redundancy in error detection and correction. Define Hamming distance? Differentiate between linear block codes and cyclic codes. [1+1+3]

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INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Computer Organization Architecture *(CT603)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What are the major differences between computer architecture and computer organization? What does the width of data bus and address bus represent in a system? Why is bus hierarchy required? [2+2+2]
2. Explain the general organization of register in CPU. Describe the operation of LD (load) instruction under various addressing modes with syntax. [6+4]
3. What are the different types of instructions? How can you perform X = (A+B) × (C+D) operation by using zero, one, two and three address instruction format. Assume A, B, C, D, X are memory address. [3+5]
4. What is address sequencing? Explain the selection of address for control memory with its block diagram. [3+7]
5. Explain the Arithmetic pipeline and instruction pipeline with example. [10]
6. Draw the flowchart for floating point Division. [4]
7. Design a booth multiplication algorithm hardware. Multiply 5 and -6 using booth multiplication algorithm. [4+4]
8. Explain cache organization. Explain the cache mapping techniques with example. [4+6]
9. Highlight the role of I/O interface in a computer system. Describe the drawbacks of programmed I/O and interrupt driven I/O and explain how DMA overcomes their drawbacks. [4+6]
10. How can multiprocessor be classified according to their memory organization? Explain. [4]

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