

PURBANCHAL UNIVERSITY

2023

B.E. (Computer)/Sixth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

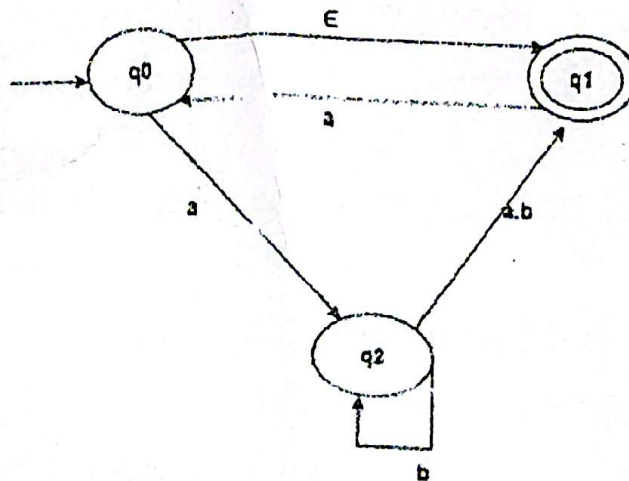
BEG377CO: Theory of Computation (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

- 1(a) Explain application and uses of Finite automata. Differentiate DFA and NFA. 2+3
- ✓(b) Design DFA over $\{0, 1\}$ that accepts odd number of 0's and even number of 1's and test your design with valid string. 5
- 2(a) Convert the following NFA to DFA. 5



- ✓(b) State pumping lemma. Using Pumping lemma Show that $a^n b^{2n}$ is not regular. 5

- ✓3(a) When does a grammar is said to be ambiguous? Show that following grammar is ambiguous. 2+4

$E \rightarrow I$

$E \rightarrow E + E$

$E \rightarrow E * E$

$E \rightarrow (E)$

$I \rightarrow a$

Contd. ...

(2)

- ✓(b) How do you remove useless and unit production from a CFG solution? 4
- 4(a) Convert the following grammar into CNF: 4
- $S \rightarrow aABc \mid BacD \mid CD \mid bc \mid e$
- $A \rightarrow aA \mid a$
- $B \rightarrow bB \mid b \mid \epsilon$
- $C \rightarrow c$
- $D \rightarrow d$
- ✓(b) Construct a PDA for the language, $L = \{a^m b^{m+n} c^n \mid m, n \geq 1\}$. 6
- 5(a) Construct a Turing machine for language 6
- $L = \{a^n b^n c^n \text{ where } n \geq 1\}$
- ✓(b) Discuss church Hypothesis (Thesis). 4
- 6(a) What is recursive and recursively enumerable language. Prove that Union of the two recursive Language is recursive. 6
- (b) Find the Automata for Regular expression $a.(a+b)^*b.b$. 4
- 7(a) How Universal Turing machine is Differ from normal Turing machine. Discuss Time and Space complexity in detail. 2+4
- Complexity.
- ✓(b) Explain NP hard and NP Complete. 4
- 8(a) State and prove Arden's theorem. 4
- ✓(b) Define deterministic and non-deterministic pushdown automata. 3
- ✓(c) What is unrestricted grammar? 3
9. Write short notes on any TWO: $2 \times 5 = 10$
- ✓(a) Decision Algorithm for regular set
- ✓(b) Closure Properties of CFL
- (c) Multitape turing machine



PURBANCHAL UNIVERSITY

2023

B.E. (Computer)/Sixth Semester/Final

Time: 03:00 hrs.

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BEG375CO: Computer Network (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.

8×10=80

1. ✓ Mention advantages and disadvantages of computer network. Explain working mechanism of OSI model in brief. 3+7
2. ✓ Describe about hub. Explain how CSMA/CD works. 6+4
3. Explain circuit switching and packet switching in brief using example. 10
4. ✓ Explain various kinds of sliding window protocols with suitable examples. Describe how checksum helps to detect error in a message using a suitable example. 5+5
5. ✓ Explain about congestion control. Describe leaky bucket algorithm in brief. 5+5
6. ✓ Mention some features of TCP/IP model. Explain the architecture of TCP/IP model. Compare OSI model with TCP/IP model. 2+4+4
7. ✓ Describe various classes of ip addresses. Explain subnet using example. 4+6
8. ✓ Explain substitution cipher technique in short With a clear diagram, explain the working mechanism of digital signature in detail. 5+5
9. Write short note on any TWO: 2×5=10
 - ✓(a) ARPANET
 - (b) Socket
 - ✓(c) Firewall

2023

UNIVERSITY

B.E. (Civil/Electronics & Comm./Computer)/Sixth Semester/Final
Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32
BEG395MS: Engineering Economics (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer FIVE questions.

5x16=80

- 1(a) Suppose you make equal annual deposits of Rs 100000 into a fund that pays a nominal interest of 12% per year compounded semi annually. Find the balances at the end of year five. 8
- 1(b) What is engineering economics? Why is it important for project implementation? What are its principles? 8
- 2(a) The information given below show the records of a manufacturing company using standard costing system: 10

	Standards	Actual
Production (Units)	2,500	2,000
Direct Material (kg)	9,000	8,000
Direct Material Cost (Rs)	2,70,000	2,18,750
Direct labours (Hrs)	9,000	10,000
Direct labours cost (Rs)	1,80,000	2,50,000
Variable Overheads (Rs)	1,00,000	1,00,000

Calculate:

- Total material variance
- Total wage variance
- Variable overheads variance

Also indicate the adverse and favorable condition.

- 1(b) With an example, explain ERR method. 6
- 3(a) Find the both types of BC ratio using present worth formula where: 8

(2)

Investment	Rs 2,50,000
Useful life	10 years
Interest	8%
Annual benefits	R 1,00,000
Annual total cost	Rs 44,000
Salvage value	Rs 40,000

(b) Evaluate using FW formulation, whether the following project is feasible or not: 6

End of year	Net cash flow (in Rs.)
0	-4,00,000
1	95,000
2	95,000
3	95,000
4	95,000
5	1,40,000

Take MARR = 12% per year.

4(a) In the design of a special use structure, two mutually exclusive alternatives are under consideration. The economic estimates are as follows: 10

	A	B
Capital investment	55,000	1,20,000
Annual expenses	-9,000	-5,500
Useful life (Yrs)	20	50
Market value at the end of useful life	10,000	22,000

If perpetual service from the structure is assumed, which design alternative should be recommended? The MARR is 10% per year. Use cotermination method.

(b) Why marketing research is needed? Explain. 6

5(a) Perform sensitivity analysis by investigating the annual worth of the following project over the range of $\pm 40\%$ in (i) Initial investment (ii) Annual net revenue (iii) Salvage value (iv) Useful life. 10

Contd. ...

(3)

Initial investment	5,00,000
Revenues per year	1,30,000
Expenses per year	1,00,000
Salvage value	5,000
Useful life	15 yrs
MARR	15%

Draw also the sensitivity diagram.

(b) What do you understand by value added tax (VAT)? Explain. 6

6. Write short notes on any FOUR:

4×4=16

- (a) Decision tree
- (b) Elements of cost
- ✓(c) Break even analysis
- ✓(d) Time value of money
- ✓(e) Cash flow diagram
- ✓(f) Payback period

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PURBANCHAL UNIVERSITY
2023

B. E. (Computer)/Sixth Semester/Final

Full Marks: 40 / Pass Marks: 16

Time: 01.00 hrs.

BEG391MS: Project and Organization Management (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

2×8=16

Answer TWO questions.

1. Define Project Management. Explain project environment in brief.
2. Define management and list out function of management. Why it is important for an engineer to have knowledge of management?
3. Given is the following information regarding a project:

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Predecessor	-	-	-	AB	B	B	FC	B	EH	EH	CDF	JK
Duration (days)	4	4	3	5	1	3	6	4	4	2	1	5

Draw the Network Diagram and identify the Critical Path and Project Duration. Find the ES, EF, LS, LF and slack time..

Group B

6×4=24

Answer SIX questions.

4. Describe characteristics of project.
5. Differentiate between tall and flat organization design.
6. What do you mean by job analysis? Explain.
7. How manager differs from a leader?
8. Write short notes on any TWO: 2×2=4
 - (a) Trade union movement in Nepal
 - (b) Project lifecycle
 - (c) WBS
 - (d) Time management
9. What do you mean by Industrial Relationship? Describe its objectives in brief.

Contd. ...

(2)

✓ 10. What is compensation and how can it be implemented in an organization?

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PURBANCHAL UNIVERSITY

2023

B. E. (Computer)/Sixth Semester/*Final*

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

BEG376CO: Multimedia Computing & Technology (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side. Necessary Tables are may be used.

Answer EIGHT questions.

8×10=80

- ✓ 1. Describe the properties of Multimedia System. Explain data stream characteristics for continuous media. 4+6
- ✓ 2. Explain the term audio and MIDI. List the differences between digital audio and MIDI. 4+6
- 3(a) What are the importance of visual representation? Explain. 6
- (b) Describe computer based animation along with the method of controlling animation. 4
- ✓ 4. Explain advantages and disadvantages of compression technique. Compare with the application area of lossy, lossless and hybrid coding. 4+6
5. Define the basic technology of optical storage media. Explain principle and area of CD Magneto Capital. 4+6
- ✓ 6. Compare hypertext, hypermedia and multimedia. Explain Open Document Architecture and MHEG in short. 4+6
- ✓ 7. Describe inter and intra object synchronization. Explain four-layer reference model. 4+6
- ✓ 8. Discuss relation between QOS and resources. Explain resource management architecture in Multimedia Communication Architecture. 4+6
- ✓ 9. Explain the concept of Earliest Deadline First algorithm. Compare and contrast it with Rate Monotonic Algorithm 7+3

Contd. ...

(2)

10. Write short notes on any TWO:

2×5=10

- ✓(a) Video on Demand and Video Conferencing
- ✓(b) Multimedia Operating System
- (c) Transport Subsystem
- (d) Application Subsystem



PURBANCHAL UNIVERSITY
2023

B. E. (Computer/Electronics & Comm.)/Sixth Semester/Final

Full Marks: 80 /Pass Marks: 32

Time: 03:00 hrs.

BEG203SH: Probability & Statistics (New Course)

Candidates are required to give their answers in their own words as far as practicable.

Students are allowed the Statistical Table (Standard Normal Table, T-distribution Table and Chi-square Table).

Answer **EIGHT** questions.

8×10=80

1(a) Distinguish between absolute and relative measure of dispersion. Which measure of dispersion will be more preferable for the study of dispersion?

~~(b)~~ A sample of 10 observations gave the the arithmetic mean of 13 and variance of 4. Later it was discovered that one observations '12' included in the sample should have been '21'. Find the correct mean and variance when wrong value is omitted.

2(a) State and prove addition theorem of probability.

~~(b)~~ Two Nepalese business houses Bhatbhatteni (BS) and Peanut Supermarket (PS) submitted their application for national business award. The award can be awarded for two business houses. The probability for getting award by BS is $1/7$ and getting by PS is $1/5$. What is the probability that

(i) Both of them will get award

(ii) only one of them will get award

3(a) Differentiate between correlation and regression.

~~(b)~~ Calculate the Karl Pearson's correlation coefficient from the following data points and hence interpret the result:

X:	2	5	10	15	20	24
Y:	50	65	70	82	100	125

Contd. ...

4(a) Give the concept of random variable and mathematical expectation.

(b) A and B enter into a bet according to which A will get Rs. 200 if it rains on that day and will lose Rs. 100 if it does not rain. The probability of raining on that day is 0.7. What is the mathematical expectation of A?

5(a) Write short notes on difference between Binomial and Poisson distribution.

(b) A car hire firm has two cars which it hires out day by day. The number of demands for a car is distributed as Poisson variate with mean 1.3. Calculate the proportion on which

- (i) neither car is used
- (ii) some demand is refused.

6(a) Discuss the importance of normal distribution.

(b) A set of final examination grades in an introductory statistics course was found to be normally distributed with a mean of 73 and a standard deviation of 8.

- (i) What percentage of students scored between 65 and 85?
- (ii) What is the probability getting grade no higher than 91 on this exam?

7(a) Discuss in brief the properties of good estimator.

(b) A random sample of 50 gave a mean of 7.5 kg and a standard deviation of 1.5 kg. Find 95% and 99% confidence interval for mean.

8(a) What is the level of significance? Differentiate between one tailed and two tailed test.

(b) Dairy development corporation claims that the mean value of its milk packets is 500ml. A random sample of 50 milk packets gave the mean volume of 490ml with the standard deviation of 10.89. Test the corporation's claim at 5% level of significance.

- 9(a) Write down the necessary steps of hypothesis testing of single mean for small samples.
- (b) The five randomly selected samples of the rubber calls have a mean breaking strength of 169.5 pounds with a standard deviation of 5.7 pounds. Test the assumption that mean braking strength in a population is 180 pounds at 1% level of significance.

- 10(a) Define χ^2 test and write the conditions for the validity of χ^2 test.
- (b) Fit the binomial distribution and test the goodness of fit to the following data points.

x	0	1	2	3	4	5
f	100	98	80	45	30	12

