

Paper Code: 6111

Programme	Course Code	Exam Code
Bachelor of Arts	BARL-6026	103206
Bachelor of Science	BECL-6026	103306

Semester-VI

Course Title: Banking (Quantitative Aptitude-II)

Time Allowed: 2:00 Hours

Theory: 80

Note: Candidates are required to attempt forty (40) MCQs, selecting at least eight (8) MCQs from each section. The remaining eight (8) MCQs may be attempted from any section. Each question carries 2 marks.

Section-I

- What is the place value of 8 in 0.096852?
 - 8/10000
 - 8/100000
 - 8/1000
 - 8/100
- How many times is 0.9 greater than 0.003?
 - 133.33
 - 30
 - 100
 - 300
- Find the difference between the largest and smallest decimal fraction. $\frac{5}{6}, \frac{6}{7}, \frac{7}{8}$ and $\frac{8}{9}$.
 - 1.523
 - 1.72
 - 0.05
 - 0.4
- Which one of the following is wrong?
 - $\frac{9}{4} + 2.75 = 5$
 - $\frac{7}{5} - \frac{7}{10} = 0.7$
 - $\frac{37}{8} + \frac{22}{16} = 6$
 - $\frac{3}{2} - \frac{51}{34} = 1$
- How many digits will be there to the right of decimal point in the product of 52.75 and 23.98?
 - 4
 - 5
 - 2
 - 3

- a) 5 c) 9
b) 6 d) 11

ny liters

15. What is cube root of (-21952) ?

- a) 38
b) 27
c) -28
d) 34

Section-II

pieces
e out of

16. The ratio of market prices of wheat and paddy is 2:3 and the ratio of quantities consumed in a family is 5:4. Find the ratio of expenditure of wheat and paddy.

- a) 6:5
b) 1:1
c) 5:6
d) 8:15

17. How to divide 3395 in the ratio of 42 : 32 : 23?

- a) 1470, 1120, 805
b) 1550, 1235 and 610
c) 1245, 1150 and 1000
d) 1764, 1022 and 529

18. If 20% of an electricity bill is deducted, then Rs. 100 is still to be paid. How much was the original bill?

- a) Rs. 110
b) Rs. 115
c) Rs. 120
d) Rs. 125

19. A's salary is 50% more than B's. How much percent is B's salary less than A's?

- a) $33\frac{1}{4}\%$
b) $33\frac{1}{3}\%$
c) $33\frac{1}{2}\%$
d) 33%

20. Ajay and Raj together have Rs. 1050. On taking Rs. 150 from Ajay, Ajay will have the same amount as what Raj had earlier. Find the ratio of amounts with Ajay and Raj initially.

- a) 3:4
b) 7:1
c) 1:3
d) 4:3

21. If $x:y = 3:4$, then $(7x+3y):(7x-3y)$ is equal to

- a) 5:2
b) 11:3
c) 4:3
d) 37:19

22. The ratio of the present age of the father to that of the son is 7:2. After 10 years, their ages will be in the ratio of 9:4. The present age of the father is.

- a) 35 years
b) 30 years
c) 40 years
d) 25 years

23. The ratio of the number of girls and boys participating in sports at a school is 4:5. If the number of girls is 212 determine the number of boys participating in the sports.

- a) 256
- b) 251
- c) 265
- d) 263

24. Express as rate percent: $6\frac{3}{4}$

- a) 625%
- b) 475%
- c) 675%
- d) 275%

25. 28% of 450 + 45% of 280

- a) 252
- b) 259
- c) 250
- d) 257

26. The present population of a city is 12000. The population is increased by 10% in the first year, and it is decreased by 20% in the next year, and in the third year, 15% of the population is increased. What will be the population after 3 years?

- a) 12144
- b) 10458
- c) 12248
- d) 11236

27. If $(x:y)=2:1$, then $(x^2-y^2):(x^2+y^2)$ is:

- a) 3:1
- b) 1:3
- c) 5:3
- d) 3:5

28. If 70% of $\frac{2}{5}$ of a number is 126, what is that number?

- a) 400
- b) 420
- c) 450
- d) 430

29. Express as a decimal: 0.2%

- a) 0.02
- b) 0.0002
- c) 0.2
- d) 0.002

30. Express as a fraction: 56%

- a) $\frac{15}{25}$
- b) $\frac{14}{25}$
- c) $\frac{26}{52}$
- d) $\frac{18}{52}$

Lib-28/5/25 - KMV II (M09)

Paper Code: 6109

Programme	Exam Code	Course Code
Bachelor of Arts	103206	BARL-6175 ✓
Bachelor of Science (Economics)	103306	BECL-6175 ✓

Semester-VI

Course Title: Economics
(Quantitative Methods for Economists)
(30)

Time Allowed: 3 Hours**Max Marks: 80**

Attempt five questions in all, selecting one from each section.
 Fifth question can be attempted from any section. Each
 question carries equal (16) marks. The Use of non-
 programmable calculator is allowed.

Section-A

1. Find the inverse of a matrix

$$A = \begin{pmatrix} 1 & 4 & 6 \\ 2 & 5 & 3 \\ 3 & 8 & 7 \end{pmatrix}$$

2. a) Find the derivative of the following function

$$Y = (X^2 + 1)(X + 1)^5$$

- b) Find the maxima and minima of the following function

$$f(x) = X^3 - 3x + 1$$

Section-B

3. a) Find the mean from the following data

Marks	0-10	0-20	0-30	0-40	0-50	0-60
No. of Students	4	7	12	15	19	25

- b) Complete the missing data. Given the median is 50

X	0-20	20-40	40-60	60-80	80-100
E	14	?	26	21	16

4. a) Find the quartile deviation

Pocket Money	100	200	300	400	500	600
No. of Students	5	8	12	20	10	5

- b) Find the combined standard deviation

Class	No. of Student	Mean Marks	Standard Deviation
B.A.	20	50	4
B.Sc.	30	60	5

Section-C

5. Find the skewness in the distribution

X	0-10	10-20	20-30	30-40	40-50
F	4	8	12	6	4

6. a) Find the coefficient of correlation from the following data

Marks in Economics	20	25	35	32	42	45	50
Marks in Statistics	16	18	20	22	25	30	35

- b) Explain the difference between correlation and regression.

Section-D

7. Construct Index no. by using Fisher's method and prove that it satisfies the time and factor reversal tests.

Commodities	Price 2011	Value 2011	Price 2021	Value 2021
A	8	40	10	90
B	7	49	12	120
C	4	36	8	72
D	6	48	8	64

8. a) Explain the assumptions of interpolation
b) Find the missing value by interpolation

Year	2015	2016	2017	2018	2019
Output	20	24	?	32	40

Paper Code: 6108

Programme	Exam Code	Course Code
Bachelor of Arts	103206	BARM-6124 ✓
Bachelor of Science (Economics)	103306	BECM-6124 ✓

Semester-VI

Course Title: Computer Applications (Vocational)
(Business Data Processing)
(20)

Time Allowed: 3 Hours**Max Marks: 50**

Note: Attempt five questions selecting at least one from each SECTION, fifth question may be attempted from any SECTION. All questions carry equal marks (10).

SECTION A

1. Explain the Characteristics of Business organization and the role of Computers in its functioning. (10)
2. Explain the use of Computer systems in Payroll and Online Reservation system. (10)

SECTION B

3. Explain Batch Processing, Online and Time sharing systems. (10)

4. What do you know about Master, Transactional and Backup files? (10)

SECTION C

5. What are Spreadsheets? Explain how to insert or delete row or column. (10)
6. What is Cell reference? Explain in detail with examples. (10)

SECTION D

7. Explain the following data analysis tools: (2X5)
- (a) Sort and Filter
 - (b) Query
8. What do you know about Functions? Explain Mathematical and Statistical functions with examples. (10)

Paper Code: 6107

Programme	Exam Code	Course Code
Bachelor of Arts	103206	BARM-6134 ✓
Bachelor of Science (Economics)	103306	BECM-6134 ✓
Bachelor of Science (Computer Science)		BCSM-6134 ✓

Semester-VI**Course Title: Computer Science (Information Technology)****(20)****Time Allowed: 3 Hours****Max Marks: 50**

Note:- Attempt five questions in all, selecting at least one question from each section. Fifth question can be attempted from any section. Each question carries equal 10 marks.

Section -A

1. What is TCP/IP? How does TCP/IP work? 10
2. What are the Different Types of Network Topology? 10

Section -B

3. Explain the different Types of Information systems 10
4. Describe the Components of Computer based information systems. 10

Section -C

5. Describe the search engine in enormous detail. 10
6. Explain website, blogs, email, webinars, videos in detail 10

Section -D

7. Explain the concept of copyright and monetization in YouTube? 10
8. How we Register a domain or subdomain with a website host. Explain with example. 10

Paper Code: 6102

Programme	Exam Code	Course Code
Bachelor of Arts	103206	BARL-6031 ✓
Bachelor of Science (Non-Medical)	103306	BSNL-6031 ✓
Bachelor of Science (Medical)		BSML-6031 ✓
Bachelor of Science (Economics)		BECL-6031
Bachelor of Science (Computer Science)		BCSL-6031 ✓
Bachelor of Commerce	108506	BCRL-6031
Bachelor of Business Administration	105406	BBRL-6031

Semester-VI
Course Title: Basic Punjabi
(30)

Time Allowed: 3 Hours

Max Marks: 40

ਨੋਟ: ਹਰ ਭਾਗ ਵਿੱਚੋਂ ਇੱਕ ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਜ਼ਰੂਰੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿੱਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ। ਹਰ ਇੱਕ ਪ੍ਰਸ਼ਨ ਦੇ 8 ਨੰਬਰ ਹਨ।

ਯੂਨਿਟ -I

1. ਪੰਜਾਬ ਸਭਿਆਚਾਰ ਦੀ ਭੂਗੋਲਿਕ ਸਥਿਤੀ ਸਪਸ਼ਟ ਕਰੋ।

2. ਪੰਜਾਬ ਸਭਿਆਚਾਰ ਦੇ ਪ੍ਰਮੁੱਖ ਲੱਛਣਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਪ੍ਰਦਾਨ ਕਰੋ।

ਯੂਨਿਟ -II

3. ਪੰਜਾਬ ਦੇ ਪ੍ਰਮੁੱਖ ਮੇਲਿਆਂ ਬਾਰੇ ਵਿਸਥਾਰ ਸਹਿਤ ਨੋਟ ਲਿਖੋ।
4. ਪੰਜਾਬ ਦੇ ਧਾਰਮਿਕ ਸਥਾਨਾਂ ਦੀ ਮਹੱਤਤਾ ਬਾਰੇ ਨੋਟ ਲਿਖੋ।

ਯੂਨਿਟ -III

5. ਜਨਮ ਨਾਲ ਸੰਬੰਧਤ ਪ੍ਰਮੁੱਖ ਰਸਮਾਂ ਕਿਹੜੀਆਂ-ਕਿਹੜੀਆਂ ਹਨ?
ਜਾਣਕਾਰੀ ਪ੍ਰਦਾਨ ਕਰੋ।
6. ਮੌਤ ਸਮੇਂ ਨਿਭਾਈਆਂ ਜਾਣ ਵਾਲੀਆਂ ਰਸਮਾਂ ਬਾਰੇ ਚਰਚਾ ਕਰੋ।

ਯੂਨਿਟ -IV

7. ਪੰਜਾਬੀ ਲੋਕ ਪਹਿਰਾਵੇ ਸੰਬੰਧੀ ਆਪਣੇ ਵਿਚਾਰ ਸਪਸ਼ਟ ਕਰੋ।
8. ਲੋਕ ਵਿਸ਼ਵਾਸ ਤੋਂ ਕੀ ਭਾਵ ਹੈ? ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਵਿੱਚ ਪ੍ਰਚਲਿਤ ਲੋਕ-ਵਿਸ਼ਵਾਸਾਂ ਬਾਰੇ ਚਰਚਾ ਕਰੋ।

Lib 14/6/25 K.M.V-II (MOR)

Paper Code: 6104

Programme	Exam Code	Course Code
Bachelor of Arts	103206	BARL-6212 ✓
Bachelor of Science (Non-Medical)	103306	BSNL-6212 ✓
Bachelor of Science (Medical)		BSML-6212 ✓
Bachelor of Science (Economics)		BECL-6212 ✓
Bachelor of Science (Computer Science)		BCSL-6212 ✓
Bachelor of Commerce	108506	BCRL-6212 ✓
Bachelor of Business Administration	105406	BBRL-6212 ✓

Semster- VI**Course Title: English (Compulsory)****(200)****Time Allowed: 3 Hours****Max Marks: 40****Section-A**

I. Answer any five questions, each carrying 2 marks (50 words each)

- i. Describe the rest house in Mano Majra and its importance and use.

- ii. Describe the coming of a ghost train from Pakistan in daytime and people's reaction to it.
- iii. Show your acquaintance with Malli.
- iv. Why is Emily crying and feeding agitated at the Beginning of the play 'The will'?
- v. What are Gaston's apprehensions about the villa Jeanne wants him to buy?
- vi. Why does Mrs. Meldon kill Prof. Corrie?

(5×2=10)

Section -B

- II. Attempt any two questions, each carrying 5 marks (250 words each)

- i. Give a character sketch of Juggut Singh.
- ii. What is the symbolic significance of the four part division of Train to Pakistan into Dacoity, Kalyug, Mano Majra and Karma?
- iii. Discuss the theme of the novel Train to Pakistan.
- iv. Give a Character sketch of Hukan Chand.

(2×5=10)

Section –C

**III. Attempt any two questions, each Carrying 5 marks
(250 words each).**

- i. How does the play 'The Will' dramatise the theme of withering human relationships? Discuss.
- ii. Discuss ' Villa for Sale' as a hilarious comedy.
- iii. Briefly explain and comment upon the anti-war theme of the play 'Progress'.
- iv. Fate rules over the people. 'Explain the theme of the play 'The Monkey's Paw' in the light of this statement. (2x5=10)

Section-D

IV. Write an essay on any of the given topics (word limit 300 words).

- i. Pleasures of Reading
- ii. Environmental Pollution (1x6=6)

- V. Write a press report for a newspaper about the seminar on 'Rising Prices' held in your college. (word limit 200 words)

Write a report on the accident that has taken place near Kartarpur-Jalandhar Highway. (1x4=4)

Paper Code: 6101

Programme	Exam Code	Course Code
Bachelor of Arts	103206	BARL-6421 ✓
Bachelor of Science (Non-Medical)	103306	BSNL-6421 ✓
Bachelor of Science (Medical)		BSML-6421 ✓
Bachelor of Science (Economics)		BECL-6421
Bachelor of Science (Computer Science)		BCSL-6421 ✓
Bachelor of Commerce	108506	BCRL-6421
Bachelor of Business Administration	105406	BBRL-6421

Semester-VI

Course Title: Punjabi (Compulsory)
(160)

Time Allowed: 3 Hours**Max Marks: 40**

ਨੋਟ:- ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿੱਚੋਂ ਇੱਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ ਅਤੇ ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿੱਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ। ਹਰ ਇੱਕ ਪ੍ਰਸ਼ਨ ਦੇ 8 ਨੰਬਰ ਹਨ।

ਸੈਕਸ਼ਨ -I

- ਹੇਠ ਲਿਖੇ ਕਾਵਿ-ਟੋਟੇ ਦੀ ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ ਕਰੋ।
ਨਾਥਾ! ਜਿਉਂਦਿਆਂ ਮਰਨ ਹੈ ਖਰਾ ਔਖਾ, ਸਾਥੋਂ ਇਹ ਨ ਵਾਇਦੇ ਹੋਵਣੇ ਨੀ।

ਅਸੀਂ ਜੱਟ ਨਾਹੜੀਆਂ ਕਰਨ ਵਾਲੇ, ਅਸਾਂ ਕਚਕੜੇ ਨਹੀਂ ਪਰੋਵਣੇ ਨੀ।

ਅਸੀਂ ਕੰਨ ਪੜਾਇ ਖੁਆਰ ਹੋਏ, ਸਾਥੋਂ ਨਹੀਂ ਹੋਂਦੇ ਐਡੇ ਰੋਵਣੇ ਨੀ।

ਸਾਥੋਂ ਖੱਪਰੀ ਨਾਦ ਨ ਜਾਣ ਸਾਂਭੇ, ਅਸਾਂ ਢੱਗੇ ਹੀ ਅੰਤ ਨੂੰ ਜੋੜਕੇ ਨੀਂ

2. ਜਪੁ ਜੀ ਸਾਹਿਬ ਬਾਣੀ (ਸ਼੍ਰੀ ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਜੀ) ਦਾ ਸਾਰ ਲਿਖੋ।

ਸੈਕਸ਼ਨ -II

3. 'ਧਰਤੀਆਂ ਦੇ ਗੀਤ' ਇਕ ਸਫਲ ਸਫਰਨਾਮਾ ਹੈ, ਚਰਚਾ ਕਰੋ।

4. 'ਧਰਤੀਆਂ ਦੇ ਗੀਤ' ਵਿੱਚ ਪੇਸ਼ ਵੱਖ-ਵੱਖ ਧਰਤੀਆਂ ਦੇ ਸਭਿਆਚਾਰ ਪਰਿਪੇਖ ਨੂੰ ਸਪਸ਼ਟ ਕਰੋ।

ਸੈਕਸ਼ਨ -III

5. ਹੇਠ ਲਿਖਿਆਂ ਵਿੱਚੋਂ ਕਿਸੇ ਇੱਕ ਵਿਸ਼ੇ ਤੇ ਨੋਟ ਲਿਖੋ।

ੳ) ਵਿਦਿਆਰਥੀ ਤੇ ਟੀ. ਵੀ ਚੈਨਲਾਂ ਦਾ ਪ੍ਰਭਾਵ

ਅ) ਮਾਤ ਭਾਸ਼ਾ ਦਾ ਪੜ੍ਹਾਈ ਵਿੱਚ ਮਹੱਤਵ

ੲ) ਵਿਦਿਆਰਥੀ ਅਤੇ ਅਨੁਸ਼ਾਸਨ

6. ਕਹਾਣੀ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੇ ਕੇ ਇਸ ਦੇ ਤੱਤਾਂ ਤੇ ਚਾਨਣਾ ਪਾਓ।

ਸੈਕਸ਼ਨ -IV

7. ਕਾਰਕ ਨੂੰ ਪਰਿਭਾਸ਼ਤ ਕਰਦਿਆਂ ਇਸ ਦੀਆਂ ਕਿਸਮਾਂ ਬਾਰੇ ਵਰਣਨ ਕਰੋ।

8. ਕਿਰਿਆਂ ਦੀ ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਇਸ ਦੀਆਂ ਕਿਸਮਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਦਿਉ।

Paper Code: 6103

Programme	Exam Code	Course Code
Bachelor of Arts	103206	BARL-6431 ✓
Bachelor of Science (Non-Medical)	103306	BSNL-6431 ✓
Bachelor of Science (Medical)		BSML-6431 ✓
Bachelor of Science (Economics)		BECL-6431
Bachelor of Science (Computer Science)		BCSL-6431 ✓
Bachelor of Commerce	108506	BCRL-6431
Bachelor of Business Administration	105406	BBRL-6431

Semester-VI

Course Title: *Punjab History and Culture*
(30)

Time Allowed: 3 Hours**Max Marks: 40**

Note: Attempt five questions, selecting at least one question from each section in 600 word and the 5th question may be attempted from any of the four section. Each question carries 8 marks.

Section-A

1. Describe the factors and forces leading to the partition of Punjab in 1947.

2. Discuss the problems of the resettlement of displaced people from the West Pakistan after the partition of the country?

Section-B

3. Describe the circumstances leading to the Formation of the Punjabi Suba in 1966.
4. Discuss the important features of Green Revolution.

Section-C

5. How did the Indian Diaspora contributed to Canada's economy
6. What do you know about the development of higher education in Punjab?

Section-D

7. Discuss the causes for Drug Addiction in the Punjab.
8. Write a note on the development of Punjabi literature with special reference to Bhai Veer Singh and Shiv Kumar Batalvi.

Hindi Version

यूनिट-1

1. 1947 में पंजाब के विभाजन के कारणों और शक्तियों का वर्णन कीजिए।
2. देश के विभाजन के बाद पश्चिमी पाकिस्तान से विस्थापितों के पुनर्वास की समस्याओं पर चर्चा कीजिए।

यूनिट-11

3. उन परिस्थितियों का वर्णन कीजिए जिनके कारण 1966 में पंजाबी सूबा का गठन हुआ।
4. हरित क्रांति की महत्वपूर्ण विशेषताओं की चर्चा कीजिए।

यूनिट-111

5. भारतीय प्रवासियों ने कनाडा की अर्थव्यवस्था में किस प्रकार योगदान दिया।
6. पंजाब में उच्च शिक्षा के विकास के बारे में आप क्या जानते हैं?

यूनिट-IV

7. पंजाब में मादक पदार्थों की लत के कारणों की चर्चा कीजिए।
8. भाई वीर सिंह, शिव कुमार बटालवी के विशेष संदर्भ में पंजाबी साहित्य के विकास पर टिप्पणी लिखिए।

Exam Code: 103206/103306

Paper Code: 6137

Bachelor of Arts/Bachelor of Science Semester-VI

Course Code: BARL-6609/BECL-6607 (Opt.-II)

Course Name: Economics (Honours): Public Finance

Examination Time: 3 Hours

Max. Marks : 80

Note: Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carries 16 marks.

Section-A

- Q1. What are the principals of Public Finance? Which of these do you prefer? 16
- Q2. Briefly explain wagner's Hypothesis of Public Expenditure? 16

Section-B

- Q3. What do you know about the principal of Ability to pay? Discuss various methods of its measurement? 16
- Q4. Explain the effects of taxation on Production and Distribution? 16

Section-C

- Q5. What is Shifting of Taxation? Give major methods of Shifting a Tax. 16
- Q6. Write short note on.
- a) Redemption of Public debt.
 - b) Objective of public Debt Management. 8 X 2 = 16

Section-D

- Q7. Briefly Explain the Following.
- a) Balanced and Unbalanced Budget.
 - b) Economic and Functional classification of Budget. 8 X 2 = 16
- Q8. Examine the Resource Mobilization for different plans in India. 16

Paper Code: 6105

Programme	Exam Code	Course Code
Bachelor of Arts	103206	BARM-6333 (I) ✓
Bachelor of Science (Non-Medical)	103306	BSNM-6333 (I) ✓
Bachelor of Science (Economics)		BECM-6333 (I) ✓
Bachelor of Science (Computer Science)		BCSM-6333 (I) ✓

Semester-VI

Course Title: Mathematics (Linear Algebra)

(40)

Time Allowed: 3 Hours

Max Marks: 40

Attempt five questions in all, selecting at least one question from each section. The Fifth question may be attempted from any section. Each question will carry 8 marks.

Section-A

Q1. (a) Define the following

- (i) Commutative ring
- (ii) Ring with Zero Divisor
- (iii) Linear Combination of Vectors
- (iv) Direct sum of vectors

(4)

(b) Show that the set of rationals Q is a field under the composition $*$ and $\cdot$ defined as $a*b = a+b-1$ and $a \cdot b = a+b-ab$ for all $a, b \in Q$.

(4)

Q2(a) Let V be a vector space over the field F . Prove that the set S of non-zero vectors $v_1, v_2, \dots, v_n \in V$ is linearly dependent iff some of these vectors say $v_k, 2 \leq k \leq n$, can be expressed as the linear combination of the preceding vectors of set S .

(4)

(b) Show that the vectors $v_1 = (1, -2, 1)$, $v_2 = (2, 1, -1)$ and $v_3 = (7, -4, 1)$ in R^3 are linearly dependent.

(4)

Section-B

Q3 Prove that any two bases of a finite dimensional vector space have the same number of elements.

(8)

Q4 If U and W are two subspaces of a finite dimensional vector space $V(F)$. Prove that

$$\dim(U + W) = \dim U + \dim W - \dim(U \cap W)$$

(8)

(b) Let $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be defined by $T(x,y,z) = (2x, 4x-y, 2x+3y-z)$. Show that T is invertible and find T^{-1} . (3)

Q6(a) Let V be a vector space over F and $T: V \rightarrow V$ be a linear operator. Prove that T is invertible iff T is one-one and onto. (5)

(b) Find a linear transformation $T: \mathbb{R}^4 \rightarrow \mathbb{R}^3$ whose null space is generated by $(2,3,4,1)$ and $(1,0,1,1)$. (3)

Section-D

Q7(a) If the matrix of a linear operator $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ relative to the usual basis is $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & -1 \\ -1 & -1 & 0 \end{bmatrix}$

Find the matrix of T relative to the basis $B_1 = \{(0,1,-1), (-1,1,0), (1,-1,1)\}$. (4)

(b) Given a matrix $\begin{bmatrix} 1/2 & 1 \\ 2/3 & 4 \end{bmatrix}$ Find the corresponding linear operator T on $\mathbb{R}^2$ relative to the basis

$B = \{(1,0), (1,1)\}$. (4)

Q8(a) Let $B = (v_1, v_2, \dots, v_n)$ be a basis for a vector space $V(F)$. Let $T: V \rightarrow V$ be a linear transformation. Prove that for any vector v in V $[T;B][v;B] = [T(v); B]$. (5)

(b) Let T be a linear operator on $\mathbb{R}^2$ defined by $T(x,y) = (4x-2y, 2x+y)$. Find matrix of T relative to the basis $B = \{(1,1), (-1,0)\}$. (3)

Paper Code: 6106

Programme	Exam Code	Course Code
Bachelor of Arts	103206	BARM-6333 (II)
Bachelor of Science (Non-Medical)	103306	BSNM-6333 (II)
Bachelor of Science (Economics)		BECM-6333 (II)
Bachelor of Science (Computer Science)		BCSM-6333 (II)

Semester- VI**Course Title: Mathematics (Numerical Analysis)****(40)****Time Allowed: 3 Hours****Max Marks: 40**

Note: Attempt five questions in all selecting at least one question from each section. The fifth question may be attempted from any section. All questions carry equal marks (8 marks each). The student can use only Non Programmable & Non storage type calculator.

SECTION-A

Q1. (a) Find $\frac{1}{\sqrt{14}}$ correct to three decimals using Newton-Raphson method.

(b) If $u = 3v^3 - 6v$, find the percentage error in u at $v=1$, if the error in v is 0.05. [4 X 2=8]

Q2 (a) Find the order of convergence of Secant method.

(b) Find a root of equation $x^3 + x^2 - 3x - 3 = 0$ between 1.5 and 1.75 correct to three decimal places using false-position method. [4 X 2=8]

SECTION-B

Q3. (a) Solve the following system of equations by Gauss-Jordan method:

$$2x + 3y + 5z = 5, \quad 3x + 4y + 7z = 6, \quad x + 3y + 2z = 5. \quad [4 \times 2=8]$$

(b) Solve the following system of equations by Gauss Jacobi method (three iterations)

$$5x - y + z = 10, \quad 2x + 4y = 12, \quad x + y + 5z = -1 \text{ (use initial solution as } (2, 3, 0)).$$

Q4 (a) Using Newton's forward difference formula, find the sum of $S_k = 1^3 + 2^3 + 3^3 + \dots + k^3$.

(b) Given $f(1) = 1$, $f(2) = 5$, $f(4) = 59$, obtain $f(3.5)$ using Lagrange Interpolation. [4 X 2=8]

SECTION-C

(b) Use interpolation to evaluate $f'(4.5)$, given

[4 X 2=8]

x	1	2	3	4	5	6	7
f(x)	0	1	3	5	8	12	18

SECTION-D

Q7. Apply Runge-Kutta fourth order method to find the solution of differential equation

$$\frac{dy}{dx} = x^2 - y \text{ at } x=0.2 \text{ in steps of } 0.1 \text{ given that } y=1 \text{ when } x=0.$$

[8]

Q8. Given $\frac{dy}{dx} = x^2(1+y)$ with $y(1) = 1$, $y(1.1) = 1.233$, $y(1.2) = 1.548$, $y(1.3) = 1.979$, by Predictor-Corrector method, compute $y(1.4)$.

[8]