Exam. Code : 103205
Subject Code : 100037

B.A./B.Sc. 5th Semester (Batch 2022-25)
QUANTITATIVE TECHNIQUES
(Quantitative Techniques–V)

Time Allowed—3 Hours] [Maximum Marks—100

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.

SECTION—A

1. Explain the following terms :
   (i) One tailed and two tailed tests
   (ii) Critical Region
   (iii) Type I and Type II Errors
   (iv) Types of Hypotheses. 20

2. (a) What do you mean by Maximum Likelihood Estimation (MLE) method ? In what sense it is different from Ordinary Least Squares (OLS) method ? Discuss in detail.
   (b) Distinguish between an estimate and an estimator. Also discuss the properties of a good estimator. 10+10=20

SECTION—B

3. What do you understand by χ^2 (Chi-square) distribution ? Derive its main properties. 20

4. Define student's t-statistic and derive its chief properties. 20

SECTION—C

5. (a) In a sample of 500 persons, 280 are found to be rice eaters and the rest are wheat eaters. Can we assume that both the articles are equally popular ?

   (b) Discuss the main applications of Z distribution.

10+10=20

6. In a laboratory experiment, two samples gave the following results :

Sample	Size	Sample Mean	Sum of squares of deviations from mean
1	10	15	90
2	12	14	108

Test the equality of sample variances at 5% level of significance. 20

SECTION—D

7. A trucking company wishes to test the average life of each of the four brands of tyres. The company uses all brands on randomly selected trucks. The records

showing the lives (thousands of miles) is given in the following table :

Brand 1	Brand 2	Brand 3	Brand 4
20	19	21	15
23	15	19	17
18	17	20	16
17	20	17	18
	16	16	

Test the hypothesis that average life of each brand of tyres is same. 20

8. What is anlaysis of variance technique ? Discuss its main assumptions. Also distinguish between one way and two way ANOVA techniques. 20

Exam. Code : 103205
Subject Code : 100028

B.A./B.Sc. 5th Sem. (Batch 2022-25)

MATHEMATICS

Paper : I (Dynamics)

Time Allowed—3 Hours] [Maximum Marks—50

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.

SECTION—A

1. (a) A man starts running at 3 m/ sec to catch the bus and the bus is beginning to move with an acceleration of $\frac{1}{3}$ m/sec^2. Man is $13\frac{1}{3}$ m behind the bus. After what time will the man be able to catch the bus ?

   (b) A ball falls freely from the top of a tower and during the last second of its flight it falls $\frac{16}{25}$ th of the whole distance. What is the height of the tower ?

2. (a) A particle travels in a straight line according to the law $x = t^3 - 75t$, where t denotes time in seconds and x denotes the distance in meters. Find the resultant force on it at 4 seconds if the particle weighs 6 kg.

(b) Prove that the least possible acceleration is $\frac{\sqrt{3}}{2}g$, if the string of an Atwood's machine can bear a strain of only $\frac{1}{8}$ of the sum of two weights.

SECTION—B

3. (a) A 100 kg body is placed on an inclined plane of 3 in 5. Calculate the horizontal force required to produce in the body with an acceleration of 4 m/sec^2 up the inclined plane.

(b) A particle of mass 1.2 kg is placed on an inclined plane whose height is half its length. It is connected by a light string passing over a pulley at the top of the plane with a mass of 0.8 kg which hangs vertically. Find the distance travelled by each of the masses in 5 seconds after they start from rest.

4. (a) A particle of mass m moves along a straight line, staring from rest from a given point in that line. If the force acting at any instant is mkcost, find the motion of the particle.

(b) A point executes a simple harmonic motion such that in two of its positions the velocities are u, v and the corresponding acceleration is α , b. Prove that the distance between two positions is $\frac{v^2 - u^2}{\alpha + \beta}$.

SECTION—C

5. (a) A body moves in a plane in such a way that its position (x, y) at any time t is given by $x = 3t^2$, $y = t^3 + 1$. Find the equation of the path of body and its velocity at any time.

(b) Two seconds after its projection, a projectile is travelling in a direction inclined at 30° to the horizon. After one more second, it is travelling horizontally. Evaluate the magnitude and direction of its initial velocity.

6. (a) If the length of Pendulum of a clock is increased in the ratio of 800 : 801, determine how many seconds the clock would lose per day.

(b) Two masses M and m are connected by a light string of length L which passes throught a small fixed ring. Find how many revolutions per second must m make as a conical Pendulum in order that M may hang at rest at a distance a below the ring.

SECTION—D

7. Prove that if a particle moves under the action of conservative system of forces, the sum of it kinetic energy and potential energy at any instant remains constant throughout the motion.

8. (a) A stone of 1200 kg is pushed over a level surface. Its velocity remains constant when it is pushed with a horizontal force of 400 newtons. Determine the work done in pushing the stone through a distance of 8 meters if velocity remains constant, assuming frictional force to be constant.

(b) A particle of weight 200 kg accelerates at 4 m/sec^2 up the inclined plane with inclination $\sin^{-1}\left(\frac{1}{100}\right)$.

Calculate the power exerted by the engine when the speed is 40 m/sec, the resistance being 10 gm-weight per kg-wt.

Exam. Code : 103205
Subject Code : 100002

B.A./B.Sc. 5th Semester (Batch 2022-25)

PUNJABI (Compulsory)

Time Allowed—3 Hours] [Maximum Marks—50

ਨੋਟ :— ਹਰੇਕ ਭਾਗ ਵਿੱਚੋਂ ਘੱਟੋ-ਘੱਟ **ਇੱਕ** ਪ੍ਰਸ਼ਨ ਦੀ ਚੋਣ ਕਰਦੇ ਹੋਏ, ਕੁੱਲ **ਪੰਜ** ਪ੍ਰਸ਼ਨ ਕਰੋ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿੱਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ। ਸਾਰੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਅੰਕ ਬਰਾਬਰ ਹਨ।

ਭਾਗ—ੳ

1. 'ਇਕਲਵਯ' ਕਹਾਣੀ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ ਲਿਖੋ।
2. 'ਹਜ਼ਾਰ ਕਹਾਣੀਆਂ ਦਾ ਬਾਪ' ਕਹਾਣੀ ਦਾ ਸਾਰ ਲਿਖੋ।

ਭਾਗ—ਅ

3. 'ਏਹੁ ਹਮਾਰਾ ਜੀਵਣਾ' ਨਾਵਲ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ ਲਿਖੋ।
4. 'ਏਹੁ ਹਮਾਰਾ ਜੀਵਣਾ' ਨਾਵਲ ਦੇ ਪਾਤਰ-ਚਿਤਰਨ ਦੇ ਪੱਖ 'ਤੇ ਨੋਟ ਲਿਖੋ।

ਭਾਗ—ੲ

5. ਹੇਠ ਲਿਖੇ ਵਿਸ਼ਿਆਂ ਵਿੱਚੋਂ ਕਿਸੇ **ਇੱਕ** ਵਿਸ਼ੇ 'ਤੇ ਪੈਰ੍ਹਾ ਰਚਨਾ ਕਰੋ :

   (ੳ) ਬੇਰੁਜ਼ਗਾਰੀ

   (ਅ) ਪ੍ਰਦੂਸ਼ਣ

   (ੲ) ਸਦਾਚਾਰ।

6. ਹੇਠ ਲਿਖੇ ਪੈਰ੍ਹੇ ਦਾ ਸ਼ੁੱਧ ਪੰਜਾਬੀ ਅਨੁਵਾਦ ਕਰੋ :

Every living thing needs air, water and food. Animals and plants grow well when proper food is supplied. Food has many kinds of nutrients. There are carbohydrates, proteins, fats and vitamins. A child needs all these nutrients in a balanced ratio for its healthy growth. Carbohydrates give us energy. It is found in rice, wheat, potatoes and grains. But we should not eat the foods that are high in simple carbohydrates like sugar. Proteins help for growth and repairing the body tissues.

ਭਾਗ—ਸ

7. ਪੰਜਾਬੀ ਵਿਅੰਜਨਾਂ ਦਾ ਵਰਗੀਕਰਨ ਕਰੋ।

8. ਵਾਕਾਤਮਕ ਜੁਗਤਾਂ ਮੇਲ ਅਤੇ ਅਧਿਕਾਰ 'ਤੇ ਨੋਟ ਲਿਖੋ।

Exam. Code : 103205
Subject Code : 100001

B.A./B.Sc. 5th Semester (Batch 2022-25)

ENGLISH (Compulsory)

Paper : ENC-301

Time Allowed—3 Hours] [Maximum Marks—50

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.

SECTION—A

1. (i) Discuss Ann Deever's role in the play *All My Sons*.

   (ii) What does the broken stump of the apple tree mean to various characters in the play ?

2. Discuss all the themes of *All My Sons*.

SECTION—B

3. (i) What is the theme of the poem 'Ozymandias' ?

   (ii) Discuss 'Dover Beach' as a spiritual testament of the modern times.

4. (i) Give the summary of the poem 'She Walks in Beauty'.

(ii) In the poem 'Meeting at Night' silence is the mode through which intensity of love is evoked. Explain.

SECTION—C

5. (i) Explain the title of the poem 'The Portrait'.

(ii) Write in your words theme of the poem 'Honeymoon Flight'.

6. 'Night of Scorpion' shows a society that is full of ignorance and superstition.

SECTION—D

7. Write a letter to the Editor of a newspaper expressing your views about condition of parks in your city.

8. Write a resume for the post of Assistant Manager in a reputed firm.

Exam. Code : 103205
Subject Code : 100029

B.A./B.Sc. 5th Semester (Batch 2022-25)

MATHEMATICS

Paper—II (Number Theory)

Time Allowed—3 Hours] [Maximum Marks—50

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.

SECTION—A

1. (a) If x and y are positive integers and $(x - y)$ is even, show that $(x^2 - y^2)$ is divisible by 4.

   (b) Show that square of every integer is of the form $8q$, $8q + 1$ or $8q + 4$, $q \in z$.

2. (a) If c/a, c/b & $\gcd\left(\frac{a}{c}, \frac{b}{c}\right) = 1$, show that $\gcd(a, b) = c$.

   (b) Find the general solution (in integers) of the equation $70x + 112y = 168$.

SECTION—B

3. (a) If x and y are real numbers, show that $[x] + [y] \leq [x+y]$; [x], [y], [x+y] are greatest integer functions.

(b) Find the highest power of 7 contained in $\lfloor\underline{1000}$

4. (a) Prove that Mobius function is multiplicative function.

(b) Prove that $\mu(n)\,\mu(n+1)\,\mu(n+2)\,\mu(n+3) = 0$ for any positive integer n, μ is Mobius function.

SECTION—C

5. (a) If $a \equiv b \pmod{m}$, then prove that $a^p \equiv b^p \pmod{m}$ for any positive integer p.

(b) Find the remainder when $3^{12} + 5^{12}$ is divided by 13.

6. (a) Show that if m is an integer then $m^2 + m + 1 \equiv 1 \pmod 3$ or $m^2 + m + 1 \equiv 0 \pmod 3$

(b) Solve : $3x - 7y \equiv 11 \pmod{13}$.

SECTION—D

7. (a) If $a^p \equiv b^p \pmod{p}$ for any prime p, then prove :

   (i) $a \equiv b \pmod{p}$

   (ii) $a^p \equiv b^p \pmod{p^2}$.

   (b) Find remainder when $2 \underline{|26}$ is divided by 29.

8. (a) Find last two digits in ordinary decimal representation of 3^{400}.

   (b) Show that 561 is a Pseudo prime.

Exam. Code : 103205
Subject Code : 100015

B.A./B.Sc. 5th Sem. (Batch 2022-25)
ECONOMICS
(Economics of Development)

Time Allowed—3 Hours] [Maximum Marks—100

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.

SECTION—A

1. What are the various measures of economic development ? Explain in detail.

2. Elucidate the concept of Disguised Unemployment and Unlimited Supply of Labour.

SECTION—B

3. Explain the Marxian concept of growth.

4. Discuss in detail Solow Model of Growth.

SECTION—C

5. Explain the difference between balanced and unbalanced growth model.

6. Discuss the various stages of Rostow's theory.

SECTION—D

7. What are the various sources of capital formation ?

8. Which technique should be used in labour abundant nation like India ?

(Punjabi Version)

ਨੋਟ :— ਹਰੇਕ ਭਾਗ ਵਿੱਚੋਂ ਘੱਟੋ-ਘੱਟ **ਇੱਕ** ਪ੍ਰਸ਼ਨ ਦੀ ਚੋਣ ਕਰਦੇ ਹੋਏ, ਕੁੱਲ **ਪੰਜ** ਪ੍ਰਸ਼ਨ ਕਰੋ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿੱਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ। ਸਾਰੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਅੰਕ ਬਰਾਬਰ ਹਨ।

ਭਾਗ—ਓ

1. ਆਰਥਿਕ ਵਿਕਾਸ ਦੇ ਵੱਖ-ਵੱਖ ਉਪਾਅ ਕੀ ਹਨ ? ਵਿਸਥਾਰ ਵਿੱਚ ਸਮਝਾਓ।

2. ਭੇਸਬੱਧ ਬੇਰੁਜ਼ਗਾਰੀ ਅਤੇ ਲੇਬਰ ਦੀ ਅਸੀਮਿਤ ਸਪਲਾਈ ਦੀ ਧਾਰਨਾ ਨੂੰ ਸਪੱਸ਼ਟ ਕਰੋ।

ਭਾਗ—ਅ

3. ਵਿਕਾਸ ਦੇ ਮਾਰਕਸਵਾਦੀ ਸੰਕਲਪ ਦੀ ਵਿਆਖਿਆ ਕਰੋ।

4. ਵਿਕਾਸ ਦੇ ਸੋਲੋ ਮਾਡਲ ਬਾਰੇ ਵਿਸਥਾਰ ਵਿੱਚ ਚਰਚਾ ਕਰੋ।

ਭਾਗ—ਏ

5. ਸੰਤੁਲਿਤ ਅਤੇ ਅਸੰਤੁਲਿਤ ਵਿਕਾਸ ਮਾਡਲ ਵਿੱਚ ਅੰਤਰ ਦੀ ਵਿਆਖਿਆ ਕਰੋ।

6. ਰੋਸਟੋ ਦੇ ਸਿਧਾਂਤ ਦੇ ਵੱਖ-ਵੱਖ ਪੜਾਵਾਂ ਦੀ ਚਰਚਾ ਕਰੋ।

ਭਾਗ—ਸ

7. ਪੂੰਜੀ ਨਿਰਮਾਣ ਦੇ ਵੱਖ-ਵੱਖ ਸਰੋਤ ਕੀ ਹਨ ?

8. ਭਾਰਤ ਵਰਗੇ ਕਿਰਤ ਭਰਪੂਰ ਦੇਸ਼ ਵਿੱਚ ਕਿਹੜੀ ਤਕਨੀਕ ਵਰਤੀ ਜਾਣੀ ਚਾਹੀਦੀ ਹੈ ?

(Hindi Version)

नोट :— प्रत्येक भाग में से कम से कम **एक** प्रश्न का चयन करते हुए, कुल **पाँच** प्रश्न करें। पांचवा प्रश्न किसी भी भाग में से किया जा सकता है। सभी प्रश्नों के समान अंक हैं।

भाग—क

1. आर्थिक विकास के विभिन्न मापदंड क्या हैं ? विस्तार से समझाइए।

2. प्रच्छन्न बेरोजगारी और श्रम की असीमित आपूर्ति की अवधारणा को स्पष्ट कीजिए।

भाग—ख

3. विकास की मार्क्सवादी अवधारणा की व्याख्या कीजिए।

4. विकास के सोलो मॉडल पर विस्तार से चर्चा कीजिए।

भाग—ग

5. संतुलित और असंतुलित विकास मॉडल के बीच अंतर स्पष्ट कीजिए।

6. रोस्टो के सिद्धांत के विभिन्न चरणों पर चर्चा कीजिए।

भाग—घ

7. पूंजी निर्माण के विभिन्न स्रोत क्या हैं ?

8. भारत जैसे श्रम-प्रचुर राष्ट्र में किस तकनीक का उपयोग किया जाना चाहिए ?

Exam. Code : 103205
Subject Code : 100007

B.A./B.Sc. 5th Semester (Batch 2022-25)

COMPUTER SCIENCE

(Database Management System & Oracle)

Time Allowed—3 Hours] [Maximum Marks—75

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.

SECTION—A

1. (i) Discuss the importance of logical data independence and physical data independence.

   (ii) What are the responsibilities of the DBA and the database designers ?

   (iii) Relation, R, has attributes (A, B, C, D, E, F) the set of FD's is :

   $A \rightarrow C$, $B \rightarrow D$, $C \rightarrow E$, $D \rightarrow E$, $E \rightarrow A$, $F \rightarrow B$.

   Find candidate key of R and justify your choice. $3 \times 5 = 15$

2. (i) Describe the terms : Primary key, Candidate key, Foreign key and Super key.

(ii) Explain how cardinalities, roles, weak entities and weak relations are represented in E-R diagrams. Demonstrate the database design with E-R Model for taking example of Student Management System. 6,9

SECTION—B

3. Define the term normalization and its need. Explain 1NF, 2NF and 3NF with suitable examples. Also discuss the problems associated with these normal forms. 15

4. Explain various database models along with their advantages and disadvantages. 15

SECTION—C

5. Consider the following schemas :

Student (sid: Integer, Firstname: string, lastname: string, age: Integer)

(i) Explain the use of logical operators using some SQL queries.

(ii) List various aggregation functions. Write SQL queries to implement aggregate functions. 7,8

6. What do you understand by a query language ? Name various query language based on Tuple and domain calculus. What are the different types of JOINs in SQL ? Explain with example. 15

SECTION—D

7. List various Concurrency Control and Management Mechanisms used in DBMS. Explain in detail the working of 2PL protocol. 15

8. Write detailed notes on the following :

   (i) Big data

   (ii) Database recovery mechanisms

   (iii) NoSQL. 3×5=15