UG-C-438 BMS-11/BMC–11

B.Sc. DEGREE EXAMINATION — DECEMBER 2020

Mathematics/Mathematics with
Computer Applications

First Year

ELEMENTS OF CALCULUS

Time: 3 Hours **Maximum Marks: 75**

SECTION - A **(5 × 5 = 25 Marks)**

Answer any FIVE questions.

1. If $y = x^2 \cos x$, prove that $x^2 \frac{d^2 y}{dx^2} - 4x \frac{dy}{dx} + (x^2 + 6)y = 0$.

2. If $v = e^{a\theta} \cos(a \log r)$ show that $\frac{\partial^2 v}{\partial r^2} + \frac{1}{r}\frac{\partial v}{\partial r} + \frac{1}{r^2}\frac{\partial^2 v}{\partial^2} = 0$.

3. Find the maximum value of $\frac{\log x}{x}$ for $x > 0$.

4. Find the envelope of the family of circles $(x - a)^2 + y^2 = 2a$, where a is the parameter.

5. Show that : $\int_0^{\pi} \frac{dx}{5 + 3\cos x} = \frac{\pi}{4}$.

6. Evaluate : $\int_0^3 \int_1^2 xy(x + y)\,dy\,dx$.

7. If $\sum V_n$ is convergent and $\frac{u_n}{v_n}$ tends to a limit other than zero as $n \to \infty$, prove that $\sum u_n$ is convergent.

8. Test the convergence of the series $\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \ldots$.

SECTION- B **(5 × 10 = 50 Marks)**

Answer any FIVE questions.

9. If $y = \sin^{-1} x$, prove that $(1 - x^2)y_2 - xy_1 = 0$ and $(1 - x^2)y_{n+2} - (2n - 1)xy_{n+1} - n^2 y_n = 0$.

10. Find the maxima and minima of the function $2(x^2 - y^2) - x^4 + y^4$.

11. Find radius of curvature at the point 't' of the curve $x = a(\cos t + t\sin t),\ y = a(\sin t - t\cos t)$.

12. Evaluate : $\int_0^{\pi/2} \log \sin x dx$.

13. Find a reduction formula for $\int \tan^n x \, dx$, n is a integer. Hence find $\int \tan^4 x \, dx$.

14. Find $\int\int xy \, dx \, dy$ taken over the positive quadrant of the circle $x^2 + y^2 = a^2$.

15. Test for convergency and divergency of the series $1 + \frac{2x}{2!} + \frac{3^2 x^2}{3!} + \frac{4^2 x^3}{4!} + ...$

16. Discuss the convergency of the series $\frac{1}{1+x} + \frac{1}{1+2x^2} + \frac{1}{1+3x^3} + ...$ for positive values of x .

UG-C-441	BMC–12

U.G. DEGREE EXAMINATION – DECEMBER 2020

First Year

Mathematics

TRIGNOMETRY, ANALYTICAL GEOMETRY (3D) AND VECTOR CALCULUS

Time : 3 hours Maximum marks : 75

SECTION A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Express $\cos 6\theta$ interms of $\cos\theta$.

2. Prove that $\cos h^{-1}x = \log_e\left[x+\sqrt{x^2-1}\right]$.

3. Prove that the planes $x+2y+2z=0$, $2x+y-2z=0$ are right angles.

4. Find the equation of the plane parallel to $2x-3y+5z+12=0$ and passing through the points (2, 3, 1).

5. Find centre and radius of the sphere $16x^2 + 16y^2 + 16z^2 - 16x - 8y - 16z - 55 = 0$.

6. Find the equation of the sphere with centre (1, –1, 2) and touching the plane $2x - 2y + z = 3$.

7. If $\phi = x^2 + y^2 - z - 1$ find $grad\ \phi$ at (1, 0, 0).

8. If $\vec{F} = x^2\vec{i} + xy\vec{j}$ evaluate $\int_C \vec{F} \cdot d\vec{r}$ from (0, 0) to (1, 1) along the line $y = x$.

SECTION B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Prove that $\cos^8 \theta = \frac{1}{2^7}[\cos 8\theta + 8\cos 6\theta + 28\cos 4\theta + 56\cos 2\theta + 35]$.

10. Find $\log(1 + i)$.

11. Find the equation of the plane passes through the intersection of the planes $2x + 3y + 10z - 8 = 0$ $2x - 3y + 7z - 2 = 0$ and is perpendicular to the plane $3x - 2y + 4z - 5 = 0$.

12. Find the image of the point (2, 3, 5) in the plane $2x + y - z + 2 = 0$.

13. Obtain the equation of the plane passing through the points (2, 2, –1), (3, 4, 2) and (7, 0, 6).

14. Find the shortest distance between the lines
$$\frac{x-8}{3}=\frac{y+9}{-16}=\frac{z-10}{7} \text{ and } \frac{x-15}{3}=\frac{y-29}{8}=\frac{z-15}{-5}.$$

15. Find the equation of the sphere which pass through the circle $x^2+y^2+z^2=5,\ x+2y+3z=5$ and touch the plane $4x+3y=15$.

16. Find $\nabla\cdot\vec{F}$ and $\nabla\times\vec{F}$ of the vector point function $\vec{F}=xz^3\vec{i}-2x^2yz\vec{j}+2yz^4\vec{k}$ at the point (1, –1, 1).

B.Sc. DEGREE EXAMINATION — DECEMBER 2020.

First Year

Mathematics with Computer Applications

COMPUTER FUNDAMENTALS AND PC SOFTWARE

Time : 3 hours Maximum marks : 75

SECTION A — ($5 \times 5 = 25$ marks)

Answer any FIVE of the following.

1. Write a short note on RAM and ROM.
2. Explain the characteristics of Reduced Instruction Set Architecture.
3. Write a short note on High Level Languages.
4. Write different components of a Window.
5. How do you format a paragraph in Word Pad?
6. Write a short note on recycle bin.
7. How do you assign a password to a word document?
8. What are the steps involved in inserting a chart in a slide?

SECTION B — (5 × 10 = 50 marks)

Answer any FIVE of the following.

9. Define an operating system. Explain distributed operating system with its advantages and disadvantages.

10. Explain different mode of communications.

11. Write a short note on computer security.

12. How do you backup your files in a computer? Explain with advantages.

13. Explain in detail the various steps involved in installing and uninstalling programs.

14. Explain page formatting in MS-WORD.

15. Write down the steps for creating mail merge document.

16. How do you create a power point presentation?

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UG-C-443 BMC-21

B.SC DEGREE EXAMINATION - DECEMBER 2020

MATHEMATICS

SECOND YEAR

GROUPS AND RINGS

Time: 3 Hours **Maximum Marks: 75**

PART- A **(5 x 5 = 25 Marks)**

Answer any FIVE questions:

1. Let Z denote the set of integers and Z^* denote the set of non-zero integers. On $S = Z \times Z^*$ define a relation R by □$(a,b)\ R\ (c,d)$ if $ad = bc$. Prove that R is an equivalence relation on S. Also state what each equivalence represent?

2. Define a cyclic group and prove that a subgroup of a cyclic group is cyclic.

3. Define centre of a group G and prove that it is a normal subgroup of G.

4. Define the following and give examples:
   (a) Integral domain
   (b) Field

5. Also prove that any field is an integral domain.
   R = $\left\{\begin{bmatrix} a & b \\ b & a \end{bmatrix} / a, b \epsilon R\right\}$ and let C be the ring of complex numbers. Show that the map
   $\varphi : R \rightarrow C$ given by φ (a + ib) = $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$

6. Define Prime and maximal ideals of a ring and prove that any maximal ideal of a ring is a prime ideal of the ring.

7. Prove that a finite integral domain is a field.

8. Define a Euclidean ring and prove that any field is a Euclidean ring.

9. Find the field of fractions of the ring of Gaussian integers.

PART-B **(5 x 10 = 50 Marks)**

Answer any FIVE questions.

10. Let R be an equivalence relation on a set S. Prove that the set of all equivalence classes under R is a partition of S.

11. Prove that any finite group is isomorphic to a subgroup of $A(S)$, for some appropriate S.

12. Let G be a group and let N be a normal subgroup of G. Define a binary operation on the set G / N of all right cosets of N in G to make G / N into a group. Also write down the order of G / H.

13. Prove that any Euclidean ring is a Principal ideal domain.

14. Let R be a commutative ring with identity. Show that an ideal M of R is maximal if R / M is a field.

15. Prove that the ring of Gaussian integers is Euclidean ring.

16. Prove that the ring, F [x] of polynomial, in X over a field F is Euclidean ring.

17. Let R be an equivalence relation on a set S. Prove that the set of all set of all equivalence classes under R is a partition of S.

18. Prove that any finite group is isomorphic to a subgroup of $A(S)$, for some appropriate S.

B.Sc. DEGREE EXAMINATION – DECEMBER 2020

Second Year

Mathematics with Computer Applications

CLASSICAL ALGEBRA AND NUMERICAL METHODS

Time : 3 hours Maximum marks : 75

SECTION A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Find the sum to infinity of the series

$$1+\frac{3}{4}+\frac{3.5}{4.8}+\frac{3.5.7}{4.8.12}+.....$$

2. If *x, y, z* be *n* real quantities show that $(n-1)\sum n^2 > 2\sum xy$.

3. Solve the equation $x^4-5x^3+4x^2+8x-8=0$ given that one of the roots is $1-\sqrt{5}$.

4. If α, β, γ are the roots of the equation $x^3 + ax^2 + bx + c = 0$, form the equation whose roots are $\alpha\beta$, $\beta\gamma$ and $\gamma\alpha$.

5. Prove that $1 + \mu^2\delta^2 = \left(1 + \frac{1}{2}\delta^2\right)^2$.

6. From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policies maturing at age 63.

Age x:	45	50	55	60	65
Premium y:	114.84	96.16	83.32	74.48	68.48

7. Solve the equation $x^2 + x^2 - 1 = 0$ for the positive root by iteration method.

8. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by (a) Trapezoidal rule

   (b) Simpson's one-third rule.

SECTION B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Sum the series $\frac{5}{1!} + \frac{7}{3!} + \frac{9}{5!} + \ldots$

10. Solve the equation

$$6x^6 - 35x^5 + 56x^4 - 56x^2 + 35x - 6 = 0.$$

11. Solve the equation $x^3 - 9x^2 + 108 = 0$ by Cardon's method.

12. Find the positive root of $x - \cos x = 0$ by bisection method.

13. Solve the system by Gauss elimination method.

$$2x + 3y - z = 5,\ 4x + 4y - 3z = 3 \text{ and}$$

$$2x - 3y + 2z = 2.$$

14. Using Stirlings' formula, find $y(1.22)$ from the following table.

x:	1.0	1.1	1.2	1.3	1.4
y:	0.84147	0.89121	0.93204	0.96356	0.98545
x:	1.5	1.6	1.7	1.8	
y:	0.99749	0.99957	0.99385	0.97385	

15. Using Newton's divided difference formula find the values of $f(2), f(8)$ and $f(15)$ given the following table:

x:	4	5	7	10	11	13
f(x):	48	100	294	900	1210	2028

16. Using Taylor series method, find $y(0.1)$ given $\frac{dy}{dx} = x + y, y(0) = 1$

B.Sc. DEGREE EXAMINATION – DECEMBER, 2020.

MATHEMATICS WITH COMPUTER APPLICATIONS

SECOND YEAR

PROGRAMMING IN C AND C++

Time : 3 Hours **Maximum Marks : 75**

PART-A (5 × 5 = 25 Marks)

Answer any FIVE questions.

1. Write a C program to read the age of the students in a school and print their average.
2. Explain call by value and call by reference.
3. Explain do-while statement.
4. Explain types of streams.
5. Write a short note on symbolic constants in C.
6. What is a pointer? How are the pointer variables declared and used in C.
7. Explain Multiple Inheritances.
8. What is a dynamic array? How is it created?

PART-B (5 × 10 = 50 Marks)

Answer any FIVE questions.

9. Write C functions (a) to read a $m \times n$ matrix (b) to print a $m \times n$ matrix (c) to find the product of two matrixes. Use it in the main program to read two matrices and to print their product if possible.
10. Explain (a) fopen (b) fclose (c) fseek (d) fprintf (e) fscanf
11. Define data types. Explain different types of data types.
12. Explain self-referential structures.
13. Enumerate for, while, and do…while loops in C.

14. A file named NUMBER contains a series of integers. Write a program to read these numbers and then write all odd numbers to a file to be called ODD and even numbers to a file to be called EVEN.
15. Explain Scope, Visibility and Lifetime of variables.
16. How do you create linked list? Explain with example.

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UG-C-446 BMC-31

B.Sc Degree Examination - December 2020

Mathematics

Third Year

REAL AND COMPLEX ANALYSIS

Time: 3 Hours **Maximum Marks: 75**

Section- A **(5 x 5 = 25 Marks)**

Answer any **FIVE** questions:

1. Prove that Q is the set of all rational numbers in countable.

2. Let (x_n) be a convergent sequence is a metric space (x,d). Then prove that
   (i) The limit is unique.
   (ii) (x_n) converges to x if and only if d (x_n, x) tends to 0.

3. Let f be a function from a metric space X to a metric space Y. Then prove that f is continuous on X if and only if f^{-1} (G) is open in X whenever G is open in Y.

4. State and prove Heine Borel theorem.

5. If f and g are real valued differentiable functions defined on R' then prove that f/g is differentiable at all points where $g \neq 0$.

6. Explain why Riemann sphere is a better model for the extended complex number system than the plane.

7. Discuss the differentiability of the function f |z| = |z| on C.

8. If C is the circle with centre z_0 and radius r then finds
$$\int \frac{dz}{(z - z_0)^{m+1}}$$

Section- B **(5 x 10 = 50 Marks)**

Answer any **FIVE** questions.

9. On R x R prove that the metrics d_1, d_2, d_3, defined below are equivalent:

$d_1((x_1, x_2), (y_1, y_2,)) = \sqrt{(x_1 - y_1)^2 + (x_2 - y_2)^2}$

$d_2((x_1, x_2), (y_1, y_2,)) = \max \{|x_1 - y_1|, |x_2 - y_2,|\}$

$d_3((x_1, x_2), (y_1, y_2,)) = \{|x_1 - y_1| + |x_2 - y_2,|$

10. State and proved the cantor's intersection theorem. Prove that the condition "F_n is closed" cannot be removed from the statement of the theorem.

11. Let X be a metric space. Then prove that the following are equivalent:
    i. X is compact
    ii. Any infinite subset of X has a limit point in X.
    iii. X is sequentially compact.
    iv. X is totally bounded and complete.
    v.

12. State and prove the Taylor's theorem with Cauchy form of remainder.

13. Write an essay on elementary bilinear transformations

14. i. Find an analytic function whose imaginary part is 2xy + 1.
    ii. Find a bilinear transformation which maps the inside of the unit circle onto the upper half plane.

15. State and prove Cauchy integral theorem for rectangle.

16. i. State and prove Cauchy's reside theorem.
    ii. Show that $\int_0^\infty \frac{bcosax}{x^2+b^2} dx = \int_0^\infty \frac{xsinax}{x^2+b^2} dx = \frac{\pi}{2} e^{-ab}$ (a,b > 0).

UG-C-447	BMC-32

B.Sc Degree Examination - December 2020

Mathematics

Third Year

LINEAR ALGEBRA AND BOOLEAN ALGEBRA

Time: 3 Hours **Maximum Marks: 75**

PART -A **(5 x 5 = 25 Marks)**

Answer any FIVE questions:

1. Prove that the intersection of two sub-spaces of a vector space is a subspace.

2. Define linearly independent set and linearly dependent set.

3. Show that dim V = rank T + nullity T, with usual notations.

4. Obtain the matrix representing the linear transformation $T : V_3 \rightarrow V_3(R)$ given by $T(a,b,c) = (3a, a - b, 2a + b + c)$ w.r.t. the standard basis $\{e_1,e_2,e_3\}$.

5. State and prove Schwartz's inequality.

6. Define a bilinear form and quadratic form.

7. Reduce the quadratic form $x_1^2 + 4x_1x_2 + 4x_1x_3 + 4x_2^2 + 16x_2x_3 + 4x_3^2$ to the diagonal form.

8. Prove that every chain is a lattice.

PART- B **(5 x 10 = 50 Marks)**

Answer any FIVE questions.

1. State and prove the fundamental theorem of homomorphism on vector spaces.

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

3. State and prove any three equivalent conditions for a set to be a basis for a vector spaces.

4. Explain Gram-Schmidt orthogonalisation process.

5. Prove that V = w $\oplus$ $w^{\perp}$, where W is a subspace of a finite dimensional inner product space V.

6. Let f be a symmetric bilinear form defined on V. Let q be the associated quadratic form. Prove that,
   (i) f (u,v) = $1/4$\{q(u+v) – q (u – v)\}
   (ii) f (u,v) = $1/2$ \{q(u+v) – q(u) – q(v)\}

7. Prove that the set of all normal subgroups of any group is modular lattice.

8. (a) In a Boolean algebra if a v x = b v x and a v x 1 = b v x 1, then prove that a = b.

   (b) Show that in a Boolean algebra [a v (a' ^ b)] 6 [b v (b ^ c)] = b.

UG-C-446 **BMC–33**

B.Sc. DEGREE EXAMINATION – DECEMBER - 2020

Mathematics with Computer Applications

Third Year

LINEAR PROGRAMMING AND OPERATIONS RESEARCH

Time: 3 Hours Maximum Marks: 75

SECTION A ($5 \times 5 = 25$ Marks)

Answer any FIVE of the following.

1. Write down the following LPP in standard form:

   Maximize $Z = 3x_1 + 2x_2 + 5x_3$

   Subject to the constraints

   $$2x_1 - 3x_2 \le 3,$$
   $$x_1 + 2x_2 + 3x_3 \ge 5$$
   $$3x_1 + 2x_3 \le 2$$
   $$x_1 \ge 0, x_2 \ge 0 \text{ and } x_3 \ge 0.$$

2. Prove that the dual of the dual is the primal.

3. Explain the difference between a transportation problem and an assignment problem.

4. Obtain an initial basic feasible solution to the following transportation problem using the north-west corner rule.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	200	

5. For the game with payoff matrix.

$$\begin{array}{cc} & \text{Player A} \\ \text{Player B} & \begin{pmatrix} -1 & 2 & -2 \\ 6 & 4 & -6 \end{pmatrix} \end{array}$$

Determine the best strategies for Player A and B and also the value of the game for them. In this game (a) fair, (b) strictly determinable.

6. Solve the following game and determine the value of the game

$$\begin{array}{cc} & \text{B} \\ \text{A} & \begin{pmatrix} 4 & -4 \\ -4 & -4 \end{pmatrix} \end{array}$$

7. Explain:

(a) Set-up cost

(b) Carrying cost

(c) Shortage cost

8. A car park contains 5 cars. The arrival of cars is Poisson at a mean rate of 10 per hour. The length of time each car spends in the car park is exponential distribution with mean of 5 hours. How many cars are in the car park on an average?

SECTION B (5 × 10 = 50 Marks)

Answer any FIVE of the following.

9. Use simplex method to solve

Maximixe $Z = 5x_1 + 3x_2$

Subject to the constraints

$$x_1 + x_2 \leq 2,$$
$$5x_1 + 2x_2 \leq 10$$
$$3x_1 + 8x_3 \leq 12$$
$$x_1, x_2 \geq 0.$$

10. Use penalty (Big–M) Method to solve

Maximixe $Z = 2x_1 + 3x_2$

Subject to the constraints

$x_1 + 2x_2 \leq 4$

$x_1 + x_2 = 3\,; x_1 \geq 0$ and $x_2 \geq 0$.

11. A company has 4 machines to do 3 Jobs. Each Job can be assigned to one and only one machine. The cost of each Job on each machine is given below. Determine the Job assignments which will minimize the total cost.

$$\begin{array}{ll} & \text{Machine} \\ & \begin{array}{cccc} \text{W} & \text{X} & \text{Y} & \text{Z} \end{array} \\ \text{Job} \begin{array}{c} \text{A} \\ \text{B} \\ \text{C} \end{array} & \begin{pmatrix} 18 & 24 & 28 & 32 \\ 8 & 13 & 17 & 18 \\ 10 & 15 & 19 & 22 \end{pmatrix} \end{array}$$

12. Use Vogel's Approximation method to obtain an initial basic feasible solution of the transportation problem.

$$\begin{array}{lcc} & \begin{array}{cccc} \text{D} & \text{E} & \text{F} & \text{G} \end{array} & \text{Available} \\ \begin{array}{c} \text{A} \\ \text{B} \\ \text{C} \end{array} & \begin{pmatrix} 11 & 13 & 17 & 14 \\ 16 & 18 & 14 & 10 \\ 21 & 24 & 13 & 10 \end{pmatrix} & \begin{array}{c} 250 \\ 300 \\ 400 \end{array} \\ \text{Demand} & \begin{array}{cccc} 200 & 225 & 275 & 250 \end{array} & \end{array}$$

13. Solve the following 2×3 game graphically

$$\begin{array}{cc} & \text{Player B} \\ \text{Player A} & \begin{pmatrix} 1 & 3 & 11 \\ 8 & 5 & 2 \end{pmatrix} \end{array}$$

14. Using the principle to dominance, solve the following game.

$$\begin{array}{cc} & \text{Player B} \\ \text{Player A} & \begin{pmatrix} 3 & -2 & 4 \\ -1 & 4 & 2 \\ 2 & 2 & 6 \end{pmatrix} \end{array}$$

15. Derive the formula for optimum lot size for a manufacturing model with no shortages, uniform demand and infinite production rate.

16. Explain the queuing mode (M/M/1): (∞/FIFO). Obtain its steady state solution.

UG-C-453 **BMC–34**

B.Sc. DEGREE EXAMINATION –
DECEMBER - 2020

Mathematics with Computer Application

Third Year

GRAPH THEORY

Time: 3 Hours Maximum Marks: 75

SECTION A ($5 \times 5 = 25$ Marks)

Answer any FIVE questions.

1. Prove that the number of odd degree vertices in a graph G is even.

2. If $q \geq p-1$, then every (p,q)-graph is either connected or contains a cycle.

3. Every connected graph G contains a spanning tree.

4. A graph which contains no contraction of K_5 or $K_{3,3}$ is planar.

5. For any graph $G \, \chi(G) \leq \Delta(G)+1$.

6. A digraph D is strongly connected if D contains a directed closed walk containing all its vertices.

7. Prove that "Every tournament D contains a vertex from which every vertex is reachable by a path of length almost 2".

8. Define the following :

   (a) Tournament.

   (b) Hole principle.

   (c) Dipartite graph.

SECTION B ($5 \times 10 = 50$ Marks)

Answer any FIVE questions.

9. Let G be a graph on at least 6 vertices. Then G or G' contains a triangle.

10. In a connected graph G, there is an Eulerian trail if and only if the number is odd degree vertices is either zero or 2.

11. A (pq)– graph G is bipartite graph if and only if it contains no odd cycles.

12. For a (p,q)– G the following statements are equivalent :

    (a) G is a tree

    (b) G is connected and $q = p-1$

    (c) G is acyclic and $q = p-1$.

13. If G is a bipartite graph with $q(G)$ is ≥ 1, then the edge-chromatic number of G $\chi_1(G)= \Delta(G)$.

14. Every strong tournament D on $p(\geq 3)$ vertices contains a directed cycle of length "k", for every k, $3 \leq k \leq p$.

15. Define the following :

    (a) Cut vertex of the graph

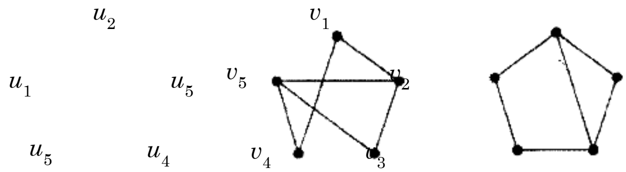
    (b) Degree of a vertex

    (c) Independent set of a graph

    (d) Walk of a graph

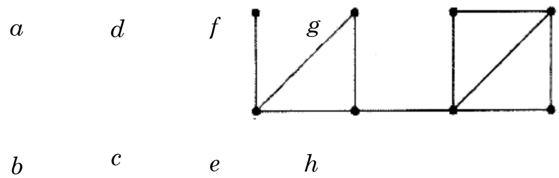
    (e) Sum of two graphs G_1 and G_2.

16. (a) Check whether the following graph is isomorphic or not.



G H

(b) Find all cut-vertices and cut-edges of the following graph-



B.Sc., DEGREE EXAMINATION – DECEMBER 2020

MATHEMATICS WITH COMPUTER APPLICATIONS

THIRD YEAR

INTRODUCTION TO INTERNET

PROGRAMMING (JAVA)

Time: 3 Hours **Maximum Marks: 75**

PART - A **(5 x 5 = 25 Marks)**

Answer any FIVE of the following:

1. What ate Java data types? Discuss with example.
2. Write a Java program to reverse a starting using away.
3. What are symbolic constants? How are they useful in developing Java programs?
4. What is a constructor? What are its special properties?
5. Explain exception? How does the Java's exception handling mechanism works?
6. What is polymorphism and how it is implemented in Java?
7. Write a short note on abstract classes and methods in Java.
8. Explain the creation and implementation of interfaces in Java.

PART - B **(5 x 10 = 50 Marks)**

Answer any FIVE of the following:

9. Discuss the following: (a) Java operations (b) Java type casting.
10. Explain the structure of Java programming with example.
11. Write a Java program to find the standard deviation of a given set of n numbers.
12. What is a constant? Explain various constants that are available in Java.

13. Develop a simple real life application program to illustrate the use of multithreading..
14. What are threads and whiat is meant by synchronization of threads?
15. Write a program to resize an applet which starts with 200 x 200 square, and grow by 25 pixels in width and height with each mouse click until the applet gets larger than 500 x 500, and then in will shrink back to 200 x 200.
16. Discuss the different levels of access protections available in Java.