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18285 (Pages : 2) Reg. No:..............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Sixth Semester B.Sc Mathematics Degree Examination, March 2018

MAT6B09 - Real Analysis

(2015 Admission onwards)

Time: 3 hours Max. Marks: 120

Section A

Answer all questions.

Each question carries 1 mark.

hen do you say that a function f : A → R is bounded ?

ind the absolute minimum of the function f : (0 , 1) → R defined by f (x) = x

efine : Lipschitz function.

ive an example of a monotone decreasing function defined on [0 , 1]

tate the location of roots theorem.

tate: Preservation of interval theorem.

ive an example of a step function.

ind the norm of the partition P = (0, 0.5, 2.5, 3.2, 4)

ive an example of an improper integral of first kind.

efine : Gamma function.

s $f(x) = \frac{1}{x}$ uniformly continuous on the set [1 , 2] ?

tate Cauchy criterion for uniform convergence of a sequence of functions.

(12 x 1 = 12 marks)

Section B

Answer any ten questions.

Each question carries 4 marks.

et I = [a , b] and f : I → R be continuous on I. Then show that f is bounded on I.

tate and prove Maximum – Minimum theorem.

efine: Uniform continuity of a function. Give an example of a continuous function which s not uniformly continuous. Justify your answer.

re all bounded functions on [0 , 1] Riemann integrable ? Justify.

ind the Riemann sum of the function f (x) = x defined in [0 , 4] with respect to the partition P = (0 , 1 , 2, 4) and tags at the right end point of the subintervals.

18. Show that constant function from [a , b] → R is Riemann integrable.

19. Find the limit of the sequence of function ($f_n(x)$) = (e^{-nx}) , x ≥ 0.

20. Evaluate β (1 , n).

21. Examine the convergence of $\int_{-1}^{1} \frac{1}{x}$ dx.

22. Prove the recurrence formula for Gamma function.

23. Find the value of $\Gamma(\frac{1}{2})$.

24. Show that β (m , n) = β (n , m).

25. If 0 < s < 1 , show that $\int_0^\infty \frac{x^{s-1}}{1+x}$ dx is convergent.

26. Define : pointwise and uniform convergence of a sequence of functions.

(10 x 4 = 40 marks)

Section C

Answer any six questions.
Each question carries 7 marks.

27. State and prove Bolzano's intermediate value theorem.

28. If f : [a , b] → R is monotone on [a , b] , then show that f is Riemann integrable.

29. If f is a uniformly continuous function on (a , b) , then show that f can be defined at the end points a and b such that the extended function is continuous on [a , b] .

30. If f ε R [a , b] , then show that f is bounded on [a , b].

31. Define : Improper integral of second kind. Test for convergence of $\int_1^5 \frac{1}{\sqrt{x^4-1}}$ dx

32. Determine the convergence of $\int_a^b \frac{dx}{(x-a)^p}$.

33. Show that β (m , n) = $\frac{\Gamma m \, \Gamma n}{\Gamma(m+n)}$.

34. Test for convergence : $\int_0^\infty \frac{dx}{\sqrt{x}+x^2}$.

35. Examine whether the sequence of function ($f_n(x)$) = ($\frac{1}{x+n}$) , x ε [1 , 2] converges Uniformly.

(6 x 7 = 42 marks)

Section D

Answer any two questions.
Each question carries 13 marks.

36. State and prove the fundamental theorem of Calculus.

37. Prove that $\int_0^\infty \frac{\sin x}{x}$ dx is conditionally convergent.

38. (i) State and prove Weierstrass M test.

(ii) Examine the convergence of the series $\sum_{n=1}^{\infty} \frac{\cos nx}{n!}$.

(2 x 13 = 26 marks)

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36M18286 (Pages : 2) Reg. No:..............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Sixth Semester B.Sc Mathematics Degree Examination, March 2018

MAT6B10 - Complex Analysis

(2015 Admission onwards)

Max. Time: 3 hours Max. Marks: 120

Section A

Answer all the twelve questions.

Each question carries 1 mark.

1. Find the Real part of $z + \frac{1}{z}$.
2. Find the domain of the function $f(z) = \frac{1}{z^2+1}$.
3. What is the period of the function $f(z) = e^{iz}$?
4. If $\lim_{z \to z_0} f(z) = w_0$ then the value of $\lim_{z \to z_0} |f(z)|$ is......
5. Write Cauchy Riemann equation.
6. Give an example of harmonic function.
7. Define Jordan Curve in complex plane.
8. Evaluate $\int_{1+i}^{1} z^3 e^{z^4} dz$.
9. If $\sum z_n$ converges then $\lim_{z \to 0} z_n$ is.
10. If R is the radius of convergence of $\sum_{n=0}^{\infty} a_n z^n$, what is the radius of convergence of $\sum_{n=0}^{\infty} a_n^2 z^n$?
11. Give an example of a function having removable singularity at $z = 0$.
12. If $f(z) = \frac{\emptyset(z)}{z-z_0}$ where $\emptyset(z)$ is analytic and non zero at z_0 then $Res_{z=z_0} f(z)$ is.

$(12 \times 1 = 12\ Marks)$

Section B

Answer any ten out of fourteen questions.

Each question carries 4 marks.

13. Show that if $f(z)$ has a derivative at z_0 then $f(z)$ is continuous at z_0.
14. Show that $f(z) = Re\ z$ is nowhere differentiable.
15. Prove that $|\sinh z|^2 = \sinh^2 x + \sin^2 y$.
16. Find the principal value of $\log(-ei)$.
17. Let a function f(z) be analytic in a domain D. Prove that f(z) must be constant in D if $\overline{f(z)}$ is analytic in D.
18. If u and v are real and imaginary part of an analytic function f(z), prove that $\begin{vmatrix} u_x & u_y \\ v_x & v_y \end{vmatrix} = |f'(z)|^2$.

19. Write the function $f(z) = z^3 + z + 1$ in the form $u(x, y) + i\, v(x, y)$

20. Evaluate $\lim_{z\to i} \frac{iz^3-1}{z-i}$.

21. Define simply connected domain.

22. State Morera's theorem.

23. Prove that absolute convergence of a series of complex numbers implies convergence

series.

24. Show that $e^z = e \sum_{n=0}^{\infty} \frac{(z-1)^n}{n!} \qquad (|z| < \infty)$.

25. Define zero of order m of an analytic function $f(z)$.

26. Show that $es_{z=i} \frac{z^3+2Z}{(z-i)^3} = 3i$.

(10 x 4 = 40 Ma

Section C

Answer any six out of nine questions.
Each question carries 7 marks.

27. If $f(z)$ is continuous at $z = z_0$ and g(w) is continuous at $w = f(z_0)$ then show that g

continuous at z_0.

28. Derive Cauchy Riemann equation in polar coordinates.

29. Find harmonic conjugate of $u(x, y) = 2x(1 - y)$.

30. Prove that $\tanh^2 z + \text{sech}^2 z = 1$.

31. Find all values of $\cosh^{-1}(-1)$.

32. Prove that for any complex valued function $w(t)$, $\left|\int_a^b w(t)dt\right| \leq \int_a^b |w(t)|dt$.

33. Evaluate $\int_C \bar{z}\, dz$ from $z = 0$ to $z = 4 + 2i$ along the curve given by the line from $z =$

$z = 2i$ then from $z = 2i$ to $z = 4 + 2i$.

34. Show that $\int_C \frac{dz}{(z-z_1)(z-z_2)} = 0$ for any simple closed path Enclosing z_1 and z_2.

35. Find the Cauchy principal value of the integral $\int_{-\infty}^{\infty} \frac{\sin x}{x^2+4x+5} dx$.

(6 x 7 = 42 M

Section D

Answer any two out of three questions.
Each question carries 13 marks.

36. State and prove M-L inequality. Using this show that $\left|\int_C \frac{dz}{z^4}\right| \leq 4\sqrt{2}$ where C denote th

segment from $z = i$ to $z = 1$.

37. Find all the Taylor and Laurent series which represent the function $f(z) = \frac{z^2-1}{(z+2)(z+3)}$

specify the regions in which these expansion are valid.

38. Evaluate $\int_0^{\infty} \frac{x^2}{x^6+1} dx$ using residues.

$(2 \times 13 = 26$ M

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B6M18287 (Pages : 4) Reg. No:..............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Sixth Semester B.Sc Mathematics Degree Examination, March 2018

MAT6B11 - Numerical Methods

(2015 Admission onwards)

Max. Time: 3 hours Max. Marks: 120

Section A

Answer all the twelve questions.
Each question carries 1 mark.

1. Write the Newton's iterative formula for finding the value of $\sqrt{N}$.
2. Find the integers between which the real root of $x^3 - 2x - 5 = 0$ lies.
3. What is the condition for the convergence of iteration method for solving $x = \phi(x)$.
4. State True/False $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$.
5. Find the linear Lagrange polynomial L(x) that passes through the points (a, f(a)) and (b, f(b)).
6. Find the second divided difference of $f(x) = \frac{1}{x}$, with arguments a, b, c.
7. Using forward difference, write the formula for $f'(a)$.
8. What is the order of error in Trapezoidal rule.
9. State True/False Gauss-Seidal iteration converges only if the coefficient matrix is diagonally dominant.
10. To which form of the coefficient matrix is transformed when AX = B is solved by Gauss elimination method.
11. The n x n matrix A = (a_{ij}) such which $a_{ij} = 0$ if $|i-j| > 1$ is called.........
12. Define central difference operator δ.

(12 x 1= 12 Marks)

Section B

Answer any the ten out of fourteen questions.
Each question carries 4 marks.

13. Using iteration method, find a root of the equation $x^3 + x^2 - 1$ correct to three decimal places.

14. Write a short note on bisection method to find a root of $f(x)$.

15. Evaluate $\Delta^2 ab^x$, interval of differencing being unity.

16. Show that $(E-1)\nabla^{-1} = 1+\Delta$ *where* $\nabla = \Delta E^{-1}$.

17. Show that $\mu = \sqrt{1+\frac{1}{4}\delta^2}$.

18. What is inverse interpolation. Reduce the formula for $L_n(y)$.

19. Find the polynomial $f(x)$ by using Lagrange's formula for

x:	0	1	2	5
$f(x)$:	2	3	12	147

20. Prove that the n^{th} divided differences of a polynomial of n^{th} degree are constants.

21. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule by taking $h = 0:25$.

22. What is Partial pivoting and Complete pivoting in the solution of linear simultaneous equation?

23. Find the spectral radius of the matrix $A = \begin{bmatrix} -4 & 9 \\ 6 & -5 \end{bmatrix}$.

24 Given $\frac{dy}{dx} = y - x$ where y(0) = 2. Find y(0.1) correct to four decimal places by Runge-Kutta second order formula.

25. Find y(0.02) by Euler's method, given that $y' = y$ *and* $y(0) = 1$

26. Solve $y' = x + y, y(0) = 1$ by Taylor series method. Hence find y(0.1).

(10 x 4 = 40 Marks)

Section C

Answer any the six out of nine questions.

Each question carries 7 marks.

Find the root of the equation $xe^x = \cos x$ using the Secant method correct to four decimal places.

Explain Ramanujan's method to determine the smallest root of the equation $f(x) = 0$.

Using the method of separation of symbols, show that

$$\Delta^n u_{x-n} = u_x - nu_{x-1} + \frac{n(n-1)}{2} u_{x-2} + \ldots + (-1)^n u_{x-n}.$$

Using following table find the value of $e^{1.17}$ using Gauss forward formula

x:	1	1.05	1.10	1.15	1.20	1.25	1.30
e^x:	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

Using Newton's general interpolation formula with divided differences, find $f(x)$ as a polynomial in x. Given

x:	-1	0	3	6	7
$f(x)$	3	-6	39	822	1611

Evaluate $\int_0^{0.6} e^{x^2} dx$ using Simpson's $\frac{1}{3}^{rd}$ rule by taking h = 0.01.

Solve the following equation by LU decomposition.

$$2x + 3y + z = 9$$
$$x + 2y + 3z = 6$$
$$3x + y + 2z = 8$$

Solve the following system by Gauss-Jordan method.

$$5x - 2y + z = 4$$
$$7x + y - 5z = 8$$
$$3x + 7y + 4z = 10$$

Establish the general formula to find y_{n+1} by Euler's modified method.

(6 x 7 = 42 Marks)

Section D

Answer any the two out of three questions.
Each question carries 13 marks.

36. Derive Newton's forward difference interpolation formula and using Newton's forward difference interpolation formula, find the sum $S_n = 1^3 + 2^3 + 3^3 + \ldots\ldots + n^3$.

37. Determine largest eigenvalue and the corresponding eigenvector of the matrix

$$A = \begin{bmatrix} 5 & 2 & 1 & -2 \\ 2 & 6 & 3 & -4 \\ 1 & 3 & 19 & 2 \\ -2 & -4 & 2 & 1 \end{bmatrix}$$

38. Explain Picards method of successive approximation of the differential equation $y' = f(x, y), y(x_0) = y_0$ and using Picards method find approximate value of y(0.2), $if\ \frac{dy}{dx} = x + y^2, y(0) = 0$.

(2 x 10 = 26 Marks)

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6M18288 (Pages : 3) Reg. No:............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Sixth Semester B.Sc Mathematics Degree Examination, March 2018

MAT6B12 - Number Theory & Linear Algebra

(2015 Admission onwards)

x. Time: 3 hours Max. Marks: 120

PART A

Answer *all twelve* questions.
Each question carries 1 mark.

1. Show that square of any integer is either of the form $3k$ or $3k + 1$.
2. If $a|b$ and $b|c$, then show that $a|c$, where a, b, c are any integers.
3. Find gcd(187,119).
4. Does there exist a solution of the Diophantine equation $187x + 119y = 306$?
5. If p, q, r are primes and $p|qr$, then prove that $p = q$ or $p = r$.
6. Find all prime numbers that divide 50!
7. If $a \equiv b \ (mod\ n)$ and $c \equiv d \ (mod\ n)$, then prove that $a + c \equiv b + d \ (mod\ n)$, where a, b, c, d, n are any integers with $n > 1$.
8. Find the remainder when 22! is divided by 23.
9. Find $\phi(121)$.
10. Is $\mathbb{C}$ a vector space over $\mathbb{R}$? What is the dimension (If your answer is "yes")?
11. Is intersection of a set of subspaces of a vector space V a subspace of V, why?
12. If the mapping $f : V \to W$ is linear then show that $f(-x) = -f(x) \quad ; \ \forall x \in V$, where V and W are any two vector spaces over the same field F.

(12 × 1 = 12 marks)

PART B

Answer *any ten* questions from among the questions 13 to 26.
Each question carries 4 marks.

13. Find all solutions of $\gcd(n, 12) = 1$ in the range $1 \le n \le 12$.
14. Investigate true or false:

    a) $\gcd(m, n) > 0$

    b) $\gcd(m, n) = \gcd(m - n, n)$

    c) $\gcd(n, n + 1) = 1$

    d) $\gcd(n, n + 2) = 2$

15. Use the Euclidean algorithm to obtain integers x and y satisfying $\gcd(187,119) = 187\,x + 119\,y$.

16. Find the remainder obtained upon dividing the sum $1! + 2! + \cdots + 99! + 100!$ by 12.

17. If p_n is the n^{th} prime number, then prove that $p_n \leq 2^{2^{(n-1)}}$.

18. Determine whether the integer 601 is prime by testing all primes $p \leq \sqrt{601}$ as possible divisors.

19. Let $N = a_m 10^m + a_{m-1} 10^{m-1} + \cdots + a_1 m + a_0$ be the decimal expansion of the positive integer $N, 0 < a_k < 10$, and let $T = a_0 - a_1 + a_2 - \cdots + (-1)^m a_m$. Then prove that $11|N$ if and only if $11|T$.

20. Find the remainder when 2^{20} is divided by 41.

21. Show that $\mathcal{B} = \{(1,1), (1,-1)\}$ form a basis for the vector space $\mathbb{R}^2$ over $\mathbb{R}$.

22. Show that the mapping $f : \mathbb{R}^3 \to \mathbb{R}^3$ given by $f(a,b,c) = (a + b + c, a + b, c)$ is linear.

23. Let $f : V \to W$ be linear. Then prove that f is injective if and only if $Ker\, f = \{0\}$.

24. If V and W are vector spaces of the same dimension n over F, then prove that V and W are isomorphic.

25. Let S_1 and S_2 be non-empty subsets of a vector space such that $S_1 \subseteq S_2$. Prove that if S_2 is linearly independent then so is S_1.

26. Let V and W be vector spaces each of dimension n over a field F. If $f : V \to W$ is linear then prove if f is injective then f carries bases to bases, in the sense that if $\{v_1, v_2, \ldots, v_n\}$ is a basis of V then $\{f(v_1), f(v_2), \ldots, f(v_n)\}$ is a basis of W.

$(10 \times 4 = 40$ marks)

PART C

Answer *any six* questions from among the questions 27 to 35.
Each question carries 7 marks.

27. Let a and b be positive integers. Show that $gcd(a,b)lcm(a,b) = ab$.

28. I have less than 30 rupees left in my MobileCom prepaid account. If I use it all for sending local SMSs for 3 paisa each then 1 paisa will be left. If I use it all for sending international SMSs for 7 paisa each then 3 will be left. If I use it all for sending MMSs for 13 paisa each then 2 paisa will be left. How much credits exactly do I have?

29. Prove that there is an infinite number of primes.

30. Solve the system of linear congruences $x \equiv 2 (\mathrm{mod}\ 3)$; $x \equiv 3 (\mathrm{mod}\ 5)$; $x \equiv 2 (\mathrm{mod}\ 7)$.

31. Let p be a prime and suppose that $p \nmid a$. Then show that $a^{p-1} \equiv 1\ (mod\ p)$.

32. If $n = p_1^{k_1} p_2^{k_2} \dots p_r^{k_r}$ is the prime factorization of $n > 1$, then show that

a) $\tau(n) = (k_1 + 1)(k_2 + 1) \dots (k_r + 1)$ and

b) $\sigma(n) = \frac{p_1^{k_1+1}-1}{p_1-1} \frac{p_2^{k_2+1}-1}{p_2-1} \dots \frac{p_r^{k_r+1}-1}{p_r-1}$.

33. Prove that the linear mapping $f: \mathbb{R}^3 \to \mathbb{R}^3$ given by $f(x, y, z) = (x + z, x + y + 2z, 2x + y + 3z)$ is neither surjective nor injective.

34. Determine whether or not the following subsets of $\mathbb{R}^3$ are subspaces.

a) $\{(x + 2y, 0, 2x - y): x, y \in \mathbb{R}\}$

b) $\{(x + 2y, x, y): x, y \in \mathbb{R}\}$

35. Consider the basis $\{(1, 1, 0); (1, 0, 1); (0, 1, 1)\}$ of $\mathbb{R}^3$. If $f : \mathbb{R}^3 \to \mathbb{R}^2$ is linear and such that

$f(1, 1, 0) = (1, 2)$; $f(1, 0, 1) = (0,0)$; $f(0,1,1) = (2,1)$, then determine f completely.

($6 \times 7 = 42$marks)

PART D

Answer *any two* questions from among the questions 36 to 38.
Each question carries 13 marks.

36. Prove that every positive integer $n > 1$ can be expressed as a product of primes; this representation isunique, apart from the order in which the factors occur.

37. If n is a positive integer and p a prime, then prove that the exponent of the highest power of p that divides $n!$ is $\sum_{k=1}^{\infty} \left[\frac{n}{p^k}\right]$, where the series is finite, because $\left[\frac{n}{p^k}\right] = 0$ for $p^k > n$. Find the highest power of 5 dividing 50!.

38. State and prove dimension theorem. Verify with an example.

($2 \times 13 = 26$marks)

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1B6M18289 (Pages : 4) Reg. No:...............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Sixth Semester B.Sc Mathematics Degree Examination, March 2018

MAT6B14(E02) - Linear Programming

(2015 Admission onwards)

Max. Time: 3 hours Max. Marks: 80

Section A

Answer all the 12 questions.
Each question carries 1 marks

1. Define convex cone in $\mathbb{R}^n$.
2. Check whether the point (2,-3) belongs to the convex hull of $\{(0,1),(1,-1)\}$
3. Find the convex hull of the set $A=\{(x,y):x^2+y^2=1\}$
4. Show that the following set is convex
   $A=\{(x_2,x_2,x_3):2x_1-x_2+x_3\leq 4\}$
5. State Minimax theorem.
6. What is the limitation of graphical method in solving LPP.
7. Define slack and surplus variables.
8. How do you recognize the optimality in the simplex method.
9. Write the number of basic variables of the general transportation problem at any stage of feasible solutions.
10. Define Triangular basis in a transportation problem.
11. What do you mean by an unbalanced transportation problem.
12. If there are n workers and n jobs, what is the total number of assignments possible.

(12 x 1= 12 Marks)

Section B

Answer any nine out of twelve questions.
Each question carries 2 marks

13. Prove that the set $S=\{(x,y)\in\mathbb{R}^2:x^2+y^2\leq 4\}$ is a convex set.
14. Distinguish between feasible solution and basic feasible solution of a linear programming problem .
15. Explain the general linear programming problem.
16. Prove that the set of all feasible solution of an LPP is a convex set.

17. Write the dual of the following linear programming problem.

Minimize $z = x_1 - 3x_2 - 2x_3$ subject to:

$$3x_1 - x_2 + 2x_3 \leq 7$$
$$2x_1 - 4x_2 \geq 12$$
$$-4x_1 + 3x_2 + 8x_3 = 10$$
$$x_1, x_2 \geq 0, \quad x_3 \text{ is unrestricted}$$

18. Why do we need artificial variables in solving LPP.

19. Explain the transportation table.

20. Define loop in transportation problem.

21. How the degeneracy arises in a transportation problem? How does we overcome it?

22. Explain the procedure for finfing initial b.f.s of a transportation problem by using Row-Minima method.

23. Write the mathematical formulation of an assignment problem.

24. Show that the assignment problem is a special case of the transportation problem.

(9 x 2 = 18 Marks)

Section C

Answer any six out of nine questions.
Each question carries 5 marks

25. Use graphical method to solve the LPP . Minimize $z = x_1 + 2x_2$ subject to: $-x_1 + 3x_2 \leq 10,\ x_1 + x_2 \leq 6,\ x_1 - x_2 \leq 2, x_1, x_2 \geq 0$

26. Formulate the following problem as a linear programming problem.

A company makes two types of leather belts. Belt A is a high quality belt , and belt B is of lower quality. The respective profits are Rs.4 and Rs.3 per belt. Each belt of type A requires twice as much time as a belt of type B . The company could make 1000 belts per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle and only 700 buckles per day are available. There are only 700 buckles per day are available for belt B. Determine the product mix to get maximum profit.

27. Prove that a basic feasible solution of an LPP must correspond to an extreme point of the set of all feasible solutions.

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

29. Explain the iterative procedure for the Two-Phase method.

30. Use simplex method to solve the LPP

$$Minimize \quad z = x_1 + 9x_2 + x_3, subject\ to:$$

$$x_1 + 2x_2 + 3x_3 \le 9$$

$$3x_1 + 2x_2 + 2x_3 \le 15$$

$$x_1, x_2, x_3 \ge 0$$

31. Explain the different methods for finding initial basic feasible solution of a transportation problem.

32. Find the initial solution of the transportation problem by Vogel's approximation method.

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

33. A department head has four subordinates S_1, S_2, S_3, S_4 and four tasks to be performed. His estimate of the time each man would take to perform each task is given in the matrix below. How should the tasks to be allocated one to a man ,so as to minimize the total man hours.

Tasks	S_1	S_2	S_3	S_4
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

(6 x 5 = 30 Marks)

Section D

Answer any two out of three questions.
Each question carries 10 marks

34. Let A be any finite subset of $\mathbb{R}^n$. Prove that the convex hull of A is the set of all convex combinations of vectors in A.

35. Solve the following LPP by using Charnes Big-M method

Minimize $z = 5x_1 - 4x_2 + 3x_3$, *subject to*

$$2x_1 + x_2 - 6x_3 = 20$$
$$6x_1 + 5x_2 + 10x_3 \le 76$$
$$8x_1 - 3x_2 + 6x_3 \le 76$$
$$x_1, x_2, x_3 \ge 0$$

36. A company has factories at F_1, F_2 and F_3 which supply warehouses at W_1, W_2 and W_3. Weekly factory capacities ,ware house requirements and unit shipping costs(in rupees) are given in the following table.

	W_1	W_2	W_3	Capacity
F_1	16	20	12	200
F_2	14	8	18	160
F_3	26	24	16	90
Requirement	180	120	150	350

(2 x 10 = 20 Ma