(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2015 ONLY)

(NO.OF PAGES: 2)

15 UMA 6S2

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : APRIL / MAY -2018

B.Sc.- MATHEMATICS (SF) **MAXIMUM MARKS: 50**

VI SEMESTER **TIME: 2 HOURS**

PART – IV : SKILL BASED ELECTIVE PAPER - II

MATHEMATICS FOR FINANCE -II

SECTION - A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. Capital budgeting decisions are divided into _________ kinds.
   a) 1 b) 2 c) 3 d) 4.

2. The average rate of return method of evaluating proposed capital expenditure is also known as the _________ method.
   a) Accounting rate of return b) accept reject rule
   c) Evaluating the project d) none of the above

3. In which method all cash flows are expressed in terms of their present values.
   a) PV b) DCF c) ARR d) NPV

4. ________ underlying the capital budgeting decision is efficiency.
   a) Assets b) rationale c) finance d) significant.

5. The full form of IRR _____________.
   a) Internal rate of return b) interest on rate of return
   c) International rate of return d) none of the above

SHORT ANSWERS.

6. Define NPV method.
7. Define cash flow.
8. Define IRR.
9. Define present value method.
10. Define the types of capital budgeting.

SECTION – B (5 X 8 = 40 MARKS)

ANSWER ANY 5 OF THE FOLLOWING QUESTIONS.

11. What are the steps taken to determining IRR for an annuity?
12. Explain the kinds of capital budgeting.
13. Explain the Pay Back method.
14. Explain the traditional techniques.
15. Explain the Incremental cash flow.

(CONTD………2)

16. Determine the average rate of return from the following data of two machines, A and B.

	Machine A	Machine B
Cost	Rs 56,125	Rs 56,125
Annual estimated income after Depreciation and income tax:		
Year 1	3,375	11,375
2	5,375	9,375
3	7,375	7,375
4	9,375	5,375
5	11,375	3,375
	36,875	36,875
Estimated life (years)	5	5
Estimated average value	3,000	3,000

Depreciation has been charged on straight line basis.

17. Explain the determination of relevant cash flows.

18. Define the difficulties of capital budgeting.

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2015 ONLY)

(NO.OF PAGES: 2)

15 UMS 616 / 15 UMA 616

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : APRIL / MAY -2018

B.Sc.- MATHEMATICS (AIDED & S.F) **MAXIMUM MARKS: 75**

VI SEMESTER **TIME: 3 HOURS**

PART-III

REAL ANALYSIS - II

SECTION-A **(10X1=10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. An open ball $B[a;r]$ with centre 'a' and radius 'r' is defined as______.
   a) $\{x \in R^1 / |x-a| < r\}$ b) $\{x \in R^1 / |x-a| \le r\}$
   c) $\{x \in R^1 / |x-a| > r\}$ d) $\{x \in R^1 / |x-a| \ge r\}$
2. A metric space is said to be _____ if every Cauchy sequences are convergent.
   a) Connected b) complete c) compact d) convex
3. Let $f(x) = x^2, (-1 \le x \le 1)$. f attains its maximum at ____
   a) $x = 1$ b) $x = -1$ c) both at (1,-1) d) never attains.
4. Every countable subset of R^1 has measure_____.a) 0 b) ∞ c) $-\infty$ d) n
5. If $f'(x) = 0$ for every x in the closed bounded interval [a,b], then f is ______.
   a) 0 at [a,b] b) 0 at (a,b) c) constant at [a,b] d) constant at (a,b)

SHORT ANSWERS:

6. Give an example to show that arbitrary intersection of open sets is open.
7. When a set A in R1 is connected?
8. When a metric space $< M, d >$ is said to be compact?
9. Find the derivative of $f(x) = |x|, (-\infty < x < \infty)$ at x=0.
10. What is Law of the mean?

SECTION-B **(5 X 5 = 25 MARKS)**

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

11. a) Show that arbitrary Union of open sets is open.

(OR)

b) Prove that if E is any subset of a metric space M, then $\overline{E}$ is closed.

12. a) Let $f: M_1 \to M_2$ be a continuous function. Show that if the domain of f is connected, then the range of f is also connected.

(OR)

b) Show that if $< M, d >$ is a complete metric space and A a is closed subset of M , then $< A, d >$ is also complete.

(CONTD………..2)

13. a) Let $\boldsymbol{f}: \boldsymbol{M_1} \to \boldsymbol{M_2}$ be a continuous function where $\boldsymbol{M_1}$ is compact metric space and $\boldsymbol{M_2}$ is a metric space. Show that $\boldsymbol{f}(\boldsymbol{M_1})$ is also compact.

(OR)

b) Explain Uniform continuity with an example.

14. a) If $\boldsymbol{f} \in \boldsymbol{R}[\boldsymbol{a}, \boldsymbol{b}]$ and $\boldsymbol{a} < \boldsymbol{c} < \boldsymbol{d}$, and $\boldsymbol{f} \in \boldsymbol{R}[\boldsymbol{a}, \boldsymbol{c}]$ and $\boldsymbol{f} \in \boldsymbol{R}[\boldsymbol{c}, \boldsymbol{b}]$, then show that $\int_{\boldsymbol{a}}^{\boldsymbol{b}} \boldsymbol{f} = \int_{\boldsymbol{a}}^{\boldsymbol{c}} \boldsymbol{f} + \int_{\boldsymbol{c}}^{\boldsymbol{b}} \boldsymbol{f}$.

(OR)

b) If $\boldsymbol{f} \in \boldsymbol{R}[\boldsymbol{a}, \boldsymbol{b}]$, then show that $|\boldsymbol{f}| \in \boldsymbol{R}[\boldsymbol{a}, \boldsymbol{b}]$ and $\left|\int_{\boldsymbol{a}}^{\boldsymbol{b}} \boldsymbol{f}\right| \leq \int_{\boldsymbol{a}}^{\boldsymbol{b}} |\boldsymbol{f}|$.

15. a) State and Prove Rolle's theorem.

(OR)

b) If f has a derivative at every point of [a,b], then Prove that $\boldsymbol{f'}$ takes on every value between $\boldsymbol{f}'(\boldsymbol{a})$ and $\boldsymbol{f}'(\boldsymbol{b})$.

SECTION-C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

16. a) If $\boldsymbol{f}$ and $\boldsymbol{g}$ are real valued functions and if $\boldsymbol{f}$ is continuous at $\boldsymbol{a}$ and $\boldsymbol{g}$ is continuous at $\boldsymbol{f}(\boldsymbol{a})$, then prove that $\boldsymbol{gof}$ is continuous at $\boldsymbol{a}$.

(OR)

b) Show that $\boldsymbol{f}$ is continuous if and only if the inverse image of every open set is open.

17. a) Prove that the set $\boldsymbol{A}$ is bounded if $\boldsymbol{A} \subset \boldsymbol{M}$ is totally bounded.

(OR)

b) Let $(\boldsymbol{M}, \boldsymbol{d})$ be a complete metric space. If $\boldsymbol{T}$ is a contraction $\boldsymbol{M}$, then show that $\boldsymbol{T}$ has precisely one fixed point.

18. a) What is Heine-Borel Property? Show that if M has the Heine Borel property then M is compact.

(OR)

b) Let $< \boldsymbol{M_1}, \boldsymbol{d_1} >$ be a compact metric space and $< \boldsymbol{M_2}, \boldsymbol{d_2} >$ is a metric space. Let $\boldsymbol{f}: \boldsymbol{M_1} \to \boldsymbol{M_2}$. Then show that $\boldsymbol{f}$ is uniformly continuous on $\boldsymbol{M_1}$.

19. a) Let $\boldsymbol{f}$ be a bounded function on the closed bounded interval [a,b].Prove that $\boldsymbol{f} \in \boldsymbol{R}[\boldsymbol{a}, \boldsymbol{b}]$ if and only if $\boldsymbol{U}[\boldsymbol{f}: \boldsymbol{\sigma}] < \boldsymbol{L}[\boldsymbol{f}: \boldsymbol{\sigma}] + \boldsymbol{\epsilon}, \ \forall \boldsymbol{\epsilon} > 0$.

(OR)

b) Prove that $\int_{\boldsymbol{a}}^{\boldsymbol{b}} \boldsymbol{\lambda} \boldsymbol{f} = \boldsymbol{\lambda} \int_{\boldsymbol{a}}^{\boldsymbol{b}} \boldsymbol{f}$, where $\boldsymbol{f} \in \boldsymbol{R}[\boldsymbol{a}, \boldsymbol{c}]$ and $\boldsymbol{\lambda}$ be any real number, and $\boldsymbol{\lambda} \boldsymbol{f} \in \boldsymbol{R}[\boldsymbol{a}, \boldsymbol{b}]$.

20. a) State and Prove second fundamental theorem of calculus.

(OR)

b) If $\boldsymbol{f}$ is continuous on the closed bounded interval [a,b], and if $\boldsymbol{F}(\boldsymbol{x}) = \int_{\boldsymbol{a}}^{\boldsymbol{x}} \boldsymbol{f}(\boldsymbol{t})\, \boldsymbol{dt}, (\boldsymbol{a} \leq \boldsymbol{x} \leq \boldsymbol{b})$, then prove that $\boldsymbol{F}'(\boldsymbol{x}) = \boldsymbol{f}(\boldsymbol{x})$.

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2015 ONLY)

(NO.OF PAGES: 2)

15 UMS 618 / 15 UMA 618

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS :APRIL / MAY -2018

B.SC.- MATHEMATICS (AIDED & S.F) **MAXIMUM MARKS: 75**

VI SEMESTER **TIME: 3 HOURS**

PART-III

DISCRETE MATHEMATICS

SECTION – A **(10X 1 =10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. The Fibonacci numbers is ___________.
   a)F_0=1,F_1=1,F_n=F_{n-2}+F_{n-3} b)F_0=0,F_1=0,F_n=F_{n-1}+F_{n-2}
   c)F_0=1,F_1=1,F_n=F_{n-1}+F_{n-2} d)F_0=0,F_1=0,F_n=F_{n-1}+F_{n-2}

2. What is T(27)?
   a)4 b)5 c)3 d)2

3. Which one of the following is compound statement?
   a)It is raining b)Today is Sunday c)It is not true that 3+4=17 d)3+4=17

4. ¬ (P∨Q) is_______________.
   a)¬P∨¬Q b) ¬P∨Q c) P∨¬Q d) ¬P∧¬Q

5. The lattice (L×M,∧,∨) is called the ________________.
   a)Sum of lattices b)Union of lattices c)Product lattices d)Intersection of lattices

SHORT ANSWERS.

6. Define Ackermann's function.
7. Define general solution of Non-homogeneous recurrence relation.
8. Define well formed formula.
9. Define functionally complete set.
10. Define lattices.

SECTION – B **(5 X 5 =25 MARKS)**

ANSWER EITHER (A) OR (B) IN EACH OF THE FOLLOWING QUESTIONS.

11(a) Use Horner's method to write p(x)=x^4+2x^3+3x^2+4x in telescopic form.

(OR)

(b) Consider D, defined by D(K)=5.2^k,k≥0, find the recurrence relation on D.

(CONTD………..2)

12(a).Write the procedure for finding the particular solution.

(OR)

(b) Solve S(k)-3S(k-1)-4S(k-2)=4^K.

13(a). Explain Connectives.

(OR)

(b) Draw the parsing tree for the formula (((¬p)→(p∧q)∧(¬ (p→q))).

14(a). Show that ((P∨Q)∧¬(¬P∧(¬Q∨¬R)))∨(¬P∧¬Q)∨(¬P∧¬R) is a tautology.

(OR)

(b). Establish that ¬ (P∧Q)→(¬P∨(¬P∨Q))⇒(¬P∨Q).

15(a). Prove that Every chain is a distributive lattice.

(OR)

(b). State and prove Distributive and modular inequalities.

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (A) OR (B) IN EACH OF THE FOLLOWING QUESTIONS.

16(a).Find the recurrence relation satisfying y_n=A$(3)^n$+B$(-4)^n$.

(OR)

(b).Find the recurrence relation satisfying y_n=(A+Bn)$(4)^n$.

17(a).Find the generating function of Fibonacci sequence.

(OR)

(b).Explain worst case analysis of Binary search algorithm.

18(a) Construct the truth table for .

(i) (p→q)↔(¬p∨q)

(ii) (p∧(p↔ q))→q

(OR)

(b).Construct the truth table for the formula (P∧Q) ∨V(¬P∧Q) ∨ (P∧¬Q) ∨ (¬P∧¬Q).

19(a).Obtain the principle conjunctive normal form of the formula (¬P→R) ∧ (Q↔P).

(OR)

(b).Obtain the principle disjunctive normal form of P→((P→Q) ∧¬ (¬Q ∨¬P))

20(a).State and Prove the properties of lattices.

(OR)

(b) Let (L,≤) be a lattice. For any a, b ∈ L, prove that the following are equivalent.

(i) a≤ b

(ii) a ∨ b =b

(iii) a∧ b =a.

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2015 ONLY)

(NO.OF PAGES: 2)

15 UMS 619 / 15 UMA 619

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : APRIL / MAY -2018

B.SC.- MATHEMATICS (AIDED & S.F) **MAXIMUM MARKS: 75**

VI SEMESTER **TIME: 3 HOURS**

PART-III

OBJECT ORIENTED PROGRAMMING WITH C++

SECTION- A (10 X 1 =10 MARKS)

ANSWER ALL THE QUESTIONS .
MULTIPLE CHOICE QUESTIONS.

1. C++ is a __________ language.
   (a) General purpose (b) Free-form (c)None (d) Super set.

2. If ___________ functions are recursive.
   (a) Switch (b) Inline (c) Goto (d) Static

3. The identifier "Employee" is a ___________data type.
   (a) User defined (b) Array (c) None (d) Member functions.

4. The appropriate member function could be selected while the program is running known as ___________.
   (a) run time polymorphism (b) late binding (c) Polymorphism (d) none

5. The old class is referred to as the base class and the new one is called the ___________.
   (a) Derived class (b) Derivation (c) Inheritance (d) Multiple inheritance

SHORT ANSWERS.

6. Define tokens.
7. Define Constructors.
8. Write General form of class definition.
9. Define late binding.
10. Define multilevel inheritance.

SECTION - B (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

11.(a) Write the structure of C++ program.

(OR)

(b) Write a program for average of two numbers.

12. (a) Explain function prototyping.

(OR)

(b) Explain copy constructor.

(CONTD……….2)

13.(a) Explain outside and inside the class definition.

(OR)

(b) Write the friendly functions.

14. (a) Describe operator overloading.

(OR)

(b) Write pointers to objects.

15. (a) Write about Multiple inheritance.

(OR)

(b) Describe Hierarchical inheritance.

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

16. (a) Define tokens and explain the various types of tokens in C++.

(OR)

(b) Define Operator and explain type of operators.

17. (a) Explain inline functions and give some example.

(OR)

(b) Write a program of constructing matrix objects.

18. (a) Write arrays of objects with some example program.

(OR)

(b) Write the functions of static data members.

19. (a) Describe Overloading binary operators using friends with some program.

(OR)

(b) Write a program of run time polymorphism.

20. (a) Write about multilevel inheritance.

(OR)

(b) Describe Constructors in derived class.

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2015 ONLY)

(NO.OF PAGES: 2)

15 UMS 615 / 15 UMA 615

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N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : APRIL / MAY -2018

B.Sc.- MATHEMATICS (AIDED & S.F) **MAXIMUM MARKS: 75**

VI SEMESTER **TIME: 3 HOURS**

PART-III

LINEAR ALGEBRA

SECTION – A **(10 X 1 = 10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. An $n \times n$ matrix A is called upper – triangular if every entry below the main diagonal is__________.
   a) 0 b) 1 c) 2 d) 3

2. An $n \times n$ matrix A over he field F is symmetric if
   a) Aij = A ii b) Ajj = Aii c) Aij = Aji d) Aji = Ajj

3. The nullspace of T is the set of all vectors $\propto$ in the vector space V over the field F if
   a) T = $\propto$ b) T$\propto$ = 0 c) T$\propto$ = 1 d) $T/_{\propto}$ =1

4. In a vector space of dimension n, a subspace of dimension n-1 is called_________.
   a) rank b) Nullity c) subspace d) hyperspace

5. The maximal proper subspace of the vector space V is a ________.
   a) subspace in V b) Space in V c) hyperspace in V d) Rank in V

SHORT ANSWERS.

6. Define row reduced matrix.
7. Define vector space over the field F.
8. Define linear transformation.
9. Explain on annihilator of a vector space.
10. Define the transpose of a matrix A.

SECTION –B **(5 X 5 = 25 MARKS)**

ANSWER EITHER 'a' OR 'b' IN EACH OF THE FOLLOWING QUESTIONS.

11.a Show that every $m \times n$ matrix A is row – equivalent to a row reduced echelon matrix.

(OR)

b. Find the linear combinations of the rows of the products of the matrix with rational entries.

$$\begin{bmatrix} 5 & -1 & 2 \\ 0 & 7 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -3 & 1 \end{bmatrix} \begin{bmatrix} 5 & -1 & 2 \\ 15 & 4 & 8 \end{bmatrix}$$

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

(OR)

b. If A is an $m \times n$ matrix over F and B, C are $n \times p$ matrix over F then prove that $A(dB + C) = d(AB)$+AC.

(CONTD..........2)

13.a If V, W and Z are vector spaces over the field F, T is a linear transformation from V into W and ∪ is a linear transformation from W into Z then prove that the composed function ∪T defined by $(\cup T)(\propto) = \cup\ [T(\propto)]$ is a linear transformation from V into Z.

(OR)

b. Prove that every n-dimensional vector space over the field F is isomorphic to the space F^n

14.a Prove that the trace function is a linear functional on the matrix space $F^{n \times n}$

(OR)

b. If W is a k – dimensional subspace of a finite dimensional vector space then prove that W is the intersection of $(n-k)$ hyperspaces in V.

15.a Let V be a finite dimensional vector space over the field F. Prove that each basis for V* is the dual of some basis for V.

(OR)

b. If ∝ is a vector in V then prove that ∝ induces a linear functional $L_\propto$ on V*.

SECTION –C (5 X 8 = 40 MARKS)

ANSWER EITHER 'a' OR 'b' IN EACH OF THE FOLLOWING QUESTIONS.

16.a Prove that if A and B are row-equivalent $m \times n$ matrices, the homogeneous systems of linear equations $A\times = 0$ and $B \times = 0$ have exactly the same solutions.

(OR)

b. If A is an $n \times n$ matrix then prove that A is row – equivalent to the $n \times n$ identity matrix iff the system of equations $A \times = 0$ has only the trivial solution.

17.a Prove that the subspace spanned by a non –empty subset S of a vector space V is the set of all linear combinations of vectors in S.

(OR)

b. Show that if W_1 and W_2 are finite dimensional subspaces of a vector space V then W_1+W_2 is finite dimensional and $\dim W_1 + \dim W_2 = \dim(W_1 \cap W_2) + \dim(W_1 + W_2)$

18.a let V be a finite dimensional vector space over the field F and let $\{\propto_1, \ldots\ldots\ldots.., \propto_n\}$ be an ordered basis for V. Let W be a vector space over the same field F and let $\beta, \ldots\ldots\ldots. \beta_n$ be any vectors in W. Prove that there is precisely one linear transformation T from V in W such that $T_{\propto i} = \beta j \quad j = 1, \ldots n$

(OR)

b. Let V and W be vector spaces over the field F. Let T and ∪ be linear transformations from V into W. Prove that the function $(T + \cup)$ defined by $(T + \cup)(\propto) = T_\propto + \cup_\propto$ is a linear transformation from V into W.

19.a Let $f_1(x_1, x_2, x_3, x_4) = x_1 + 2x_2 + 2x_3 + x_4$, $f_2(x_1, x_2, x_3, x_4) = 2x_2 + x_4$, $f_3(x_1, x_2, x_3, x_4) = -2x_1 - 4x_3 + 3x_4$ be the linear functionals on R^4 ?

(OR)

b. Let V be an n-dimensional vector space over the field F and W an M – dimensional vector space over F. Let T be a linear transformation from V into W and the matrix A determines T. Prove that $A \times$ is the coordinate matrix of the vector $T_\propto$.

20.a If V is a finite – dimensional vector space over the field F, for each vector ∝ in V defined by $L_\propto(f) = f(\propto)$, f in V* prove that the mapping $\propto \to L_\propto$ is an isomorphism of V onto V**.

(OR)

b. Let V and W be finite dimensional vector spaces over the field F. Let 𝔅 be an ordered basis for V with dual basis 𝔅* and let 𝔅` be an ordered basis for W with dual basis 𝔅`*. Let T be a linear transformation from V into W, A be the matrix of T relative to 𝔅, 𝔅' and B be the matrix of T^t relative to 𝔅'* , 𝔅* . Prove that Bij = Aji.

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2015 ONLY)

(NO.OF PAGES: 2)

15 UMS 617 / 15 UMA 617

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : APRIL / MAY -2018

B.SC.- MATHEMATICS (AIDED & S.F) **MAXIMUM MARKS: 75**

VI SEMESTER **TIME: 3 HOURS**

PART-III

COMPLEX ANALYSIS - II

SECTION-A(10X1=10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS:

1. A Harmonic function is said to satisfie the formal differential equation $\frac{\partial^2 w}{\partial z \partial \bar{z}}$= _____

   a)0 b)1 c)2 d)-1

2. If $\lim_{n\to\infty} z_n = A$, then $\lim_{n\to\infty} \frac{1}{n}(z_1 + z_2 + \cdots + z_n) =$ ________.

   a)A b)0 c)∞ d) 1/A

3. An arc is a _____ curve if its end points coincide.

   a) open b) closed c) conformal d) regular

4. The function of a the index $n(\gamma, a)$ is constant in each of the regions determined by γ and _____in the unbounded region.

   a) 0 b)1 c) $\neq 0$ d) ∞

5. A non-constant analytic function maps _________

   a) open sets into open sets b) closed sets onto closed sets

   c) open sets onto open sets d) open sets onto closed sets.

SHORT ANSWERS:

6. When a function f(z) is said to be analytic?
7. Define Cauchy sequence.
8. Write the formula to find the length of an arc.
9. When a function $f(z)$ is said to be exact differential?
10. State the Maximum Principle.

(CONTD……….2)

SECTION-B (5X5=25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

11. a. If all zeros of a polynomial p(z) lie in a half plane then prove that all the zeros of derivative p'(z) lie in the same half plane.

(OR)

b. If a function $f(z)$ is analytic , then show that it is independent of $\bar{z}$.

12. a. What is power series? Explain with an example.

(OR)

b. Prove that every convergent sequence is bounded.

13. a. Show that $e^{z_1 z_2} = e^{z_1+z_2}$.

(OR)

b. Prove that at each point z of a domain where f(z) is analytic and $f'(z) \neq 0$, the mapping $w = f(z)$ is conformal.

14. a. Let $f(z)$ be analytic on the set R' obtained from the rectangle R by omitting a finite number of interior points ζ_j. If $\lim_{z\to\zeta_j}(z-\zeta_j)f(z) = 0$ is true for all j, then prove that $\int_{\partial R} f(z)dz = 0$.

(OR)

b. If the piecewise differentiable closed curve γ does not pass through the point a, then prove that the value of the integral $\int_\gamma \frac{dz}{z-a}$ is a multiple of $2\pi i$.

15.a. If f(z) has a pole at z=a, then prove that $|f(z)| \to \infty$ as $z \to \infty$.

(OR)

b. If f(z) and g(z) are analytic in Ω and if f(z)=g(z) on a set which has a limit point in Ω, then show that f(z) is identically equal to g(z).

SECTION-C (5X8=40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

16.a. Explain the sufficient condition for a function to be analytic.

(OR)

b. Prove that every rational function is represented by partial fractions.

17. a. Show that a sequence $\{z_n\}$ is convergent if and only if it is a Cauchy sequence.

(OR)

b. Find the radius of convergence of power series for (i)$\sum_{n=0}^{\infty}\left(\frac{n\sqrt{2}+i}{1+2in}\right)z^n$ (ii) $\sum \frac{2^{-n}z^n}{1+m^2}$.

18. a. Prove that an analytic function in a region Ω whose derivative vanishes identically must reduce to a constant. The same is true if either the real part, the imaginary part, the modulus or the argument is constant.

(OR)

b. If the mapping $w = f(z)$ is conformal, then show that $f(z)$ is an analytic function of z.

19. a. State and prove the necessary and sufficient conditions under which line integral depends only on the end points .

(OR)

b. State and Prove Cauchy's theorem in a rectangle.

20.a. State and Prove Schwarz's lemma.

(OR)

b . Find the kind of singularities of (i) $f(z) = sin\left(\frac{1}{1-z}\right)$ at z=1 (ii) $f(z) = \frac{1}{\sin z - \cos z}$.

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2016 ONLY)

(NO. OF PAGES: 4)

16UMA4A5

N.G.M.COLLEGE (AUTONOMOUS): POLLACHI

END-OF-SEMESTER EXAMINATIONS: APRIL 2018

B.Sc-MATHS (SELF-FINANCING) **MAXIMUM MARKS: 75**

SEMESTER: IV **TIME: 3 HOURS**

PART-III

COST AND MANAGEMENT ACCOUNTING

SECTION – A (10X1=10 MARKS)

ANSWER THE FOLLOWING QUESTIONS

MULTIPLE CHOICE QUESTIONS.

1. Basic objective of cost accounting is ----------------.

   a)Tax compliance b)Financial audit c)Cost ascertainment d)None of these.

2. Material requisition is meant for -------------

   a) Supply of material from stores b) Purchase of material

   c)Sale of control d) None of the above.

3. Management accounting helps management to __________.

   a) Raising finance b) Decision making

   c) Preparation of final accounts d) Filing tax returns.

4. Funds inflow from operations is __________

   a) An application of funds b) An external source of funds

   c) An internal source of funds d) None of these.

5. Sales budget is -------------

   a) Budget for selling expenses b) Budget of revenue and expenses

   c) a list of incentives to salesmen d) Budget of output to be sold

SHORT ANSWERS

6. What do you mean by sunk cost?
7. What is EOQ?
8. State any two limitations of cost accounting.
9. What is net working capital?
10. What is forecasting?

SECTION – B (5X4=20 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

11.a)From the following particulars prepare a statement showing the components of the total sales and the profit for the year ended 31st Dec.

(CONTD………2)

Particulars	Amount (Rs)	Particulars	Amount (Rs)
Stock of finished goods (1st Jan)	6,000	Other production expenses	43,000
Stock of raw materials (1st Jan)	40,000	Stock of finished goods (31st Dec)	15,000
Work in progress (1st Jan)	15,000	Wages	1,75,000
Purchase of raw materials	4,75,000	Works managers salary	30,000
Carriage inwards	12,500	Factory employees salary	60,000
Factory rent, taxes	7,250	Power expenses	9,500
General expenses	32,500	Work in progress (31st Dec)	10,000
Sales for the year	8,60,000	Stock of raw materials(31st Dec)	50,000

(OR)

b) Mr.Gopal furnishes the following data relating to the manufacture of standard product during the month of April.

Particulars	Amount (Rs)
Raw materials consumed	15,000
Direct labour charges	9,000
Machine hours worked	900
Machine hour rate	5
Administrative Overhead	20% of works cost
Selling overhead	0.50 per unit
Units produced	17,100 units
Units sold	16,000 at Rs.4 per unit

Prepare a cost sheet and show:
a) Cost per unitb) Profit per unit and c) Profit for the period.

12.a) A worker is paid a basic rate of Rs 20 per hour. In addition he gets Rs 2,000 per week of 48 hours as dearness allowance. He completes a job with standard time of 60 hours during the weekof 48 hours. Ascertain his earnings under.
a) Halsey premium b) Rowan premium plan

(OR)

b) Calculate re-order stock level, maximum stock level, minimum stock level, and average stock level form the following:

Re-order quantity	2400 units
Re-order period	4-6 weeks
Maximum consumption	450 units per week
Minimum consumption	150 units per week
Normal consumption	300 units per week

13.a) State the nature of management accounting.

(OR)

b) Bring out advantages of management accounting.

14.a) Calculate funds from operations from the following profit and loss account

Profit & Loss Account			
Particulars	Amount (Rs)	Particulars	Amount (Rs)
To expenses paid and out standing	3,00,000	By Gross Profit	4,50,000
To depreciation	70,000	By Gain on Sale of Land	60,000
To Loss on sale of Machine	4,000		
To Discount	200		
To goodwill	20,000		
To Profit	1,15,800		
	5,10,000		5,10,000

. (CONTD………3)

(OR)

b) Calculate cash flow statement from the following information.

Particulars	2016 Rs.	2017 Rs.
Bills receivable	20,000	25,000
Debtors	1,00,000	80,000
Outstanding expenses	1,600	2,000
Creditors	50,000	40,000
Accrued income	12,000	14,000
Bills payable	80,000	50,000
Profit and loss account	1,00,000	3,60,000

15.a) A manufacturing concern, which has adopted standard costing, furnished the following information:
Standard:
Material for 70 kg finished products:100 kg
Price of materials : Re 1 per kg
Actual:
Outpur :2,10,000 kg
Material used : 2,80,000 kg
Cost of materials : Rs 2,52,000
Calculate a) Materialusage variance b) Materialprice variance
c) Material cost variance

(OR)

b) Using the following information, calculate labour variance:
Gross direct wages = Rs 3,000
Standard hours produced = Rs1,600
Standard rate per hour = Rs 1.50
Actual hours paid 1,500 hours, out of which hours not worked (abnormal idle time) are 50.

SECTION – C (3 X15=45 MARKS)

ANSWER ANY THREE OF THE FOLLOWING QUESTIONS.

16. The accounts of Pleasant Company Ltd, shows for 2014:
Materials Rs 3,50,000, LaboutRs 2,70,000, Factory overheads Rs 81,000, and Administrative overheads Rs 56,080
What price should the company quote for a refrigerator? It is estimated that Rs 1,000 in materials and Rs 700 in labour will be required for one refrigerator. Absorb factory overheads on the basis of labour and administrative overheads on the basis of works cost. A profit of 12.5% on selling price is required.

17. From the following transactions prepare stores ledger account under FIFO method

Jan 2 Purchased 4,000 units at Rs 4.00 per unit
4 Purchased 500 units at Rs 5.00 per unit
7. Issued 2,000 units
10. Purchased 6,000 units at Rs.6.00per unit
12. Issued 4,000 units
15. Issued 1,000 units

21. Issued 2,000 units
28. Purchased 4,500 units at Rs.5.50 per unit
30. Issued 3,000 units

Adopt the FIFO method of issue and ascertain the value of the closing stock.

18. Distinction between management accounting and financial accounting.

19. From the following Balance sheet of Apple Ltd on 31st December 2016 and 2017. You are required to prepare a fund flow statement.

Liabilities	2016 (Rs)	2017 (Rs)	Assets	2016 (Rs)	2017 (Rs)
Share capital	1,00,000	1,00,000	Goodwill	12,000	12,000
General reserve	14,000	18,000	Building	40,000	36,000
Profit & loss a/c	16,000	13,000	Plant	37,000	36,000
Sundry creditors	8,000	5,400	Investment	10,000	11,000
Bills payable	1,200	800	Stock	30,000	23,400
Provision for taxation	16,000	18,000	Bills receivable	2,000	3,200
Provision for doubtful debts	400	600	Debtors	18,000	19,000
			Cash	6,600	15,200
Total	1,55,600	1,55,800	Total	1,55,600	1,55,800

The following additional information has also been given:

1) Depreciation charged on plant was Rs.4,000 and on building Rs. 4,000.
2) Provision for taxation of Rs.19,000 was made during 2017.
3) Interim dividend of Rs. 8,000 was paid during 2017.

You are required to prepare a cash flow statement.

20. The following information relates to a flexible budget at 60% capacity. Find out the overhead costs at 50% and 70% capacity.

Particulars	Expenses at 60% capacity
Variable Overheads:	
Indirect labour	10,500
Indirect Materials	8,400
Semi-Variable Overheads:	
Repairs & Maintenance (70% fixed, 30% variable)	7,000
Electricity (50% fixed, 50% variable)	25,200
Fixed Overheads:	
Office expenses including salaries	70,000
Insurance	4,000
Depreciation	20,000
Estimated direct labour hours	1,20,000

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2017 ONLY)

(NO.OF PAGES: 2)

17 UMS 203 / 17 UMA 203

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : APRIL / MAY -2018

B.Sc.- MATHEMATICS (AIDED & S.F) MAXIMUM MARKS: 75

II SEMESTER TIME: 3 HOURS

PART-III

TRIGNOMETRY, VECTOR CALCULUS AND FOURIER SERIES

SECTION – A (10X1=10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. The sum of the powers of cosθ and sinθ in every term of the expansions is _________.
   a) $\neq 1$ b) =n c) $\neq$ n d) 1
2. The value of tan(ix) = ______________.
   a) tanhx b) tanx c)itanx d) itanhx
3. In ---------- series containing cosines alone and sines alone__________.
   a) Development in cosine b) Development in sine c) Half range d) None
4. If ϕ *and* ψ are scalar point functions and c is constant then__________.
   a) $\nabla c \neq 0$ b) ∇c=0 c) ∇c=1 d) $\nabla c \neq 1$
5. ---------- gives the connection between line integral and surface integral
   a) Gauss divergence theorem b) Greens theorem c) Stokes theorem d) None

SHORT ANSWERS

6. Write the expansion of cosnθ .
7. Prove that sinh(x+y)=sinhxcoshy+coshxsinhy.
8. Define Even function.
9. Define solenoidal vector.
10. Define Line Integral.

SECTION – B (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

11. a) Express $\frac{\sin 6\theta}{\sin \theta}$ interms of cosθ .

(OR)

b) Expand $\sin^7\theta$ in series of sines of multiples of θ .

12. a) Express $\tanh^{-1}$x in terms of logarithmic function.

(OR)

b) If sin(A+iB)=x+iy , prove that (i) $\frac{x^2}{\sin^2 A} - \frac{y^2}{\cos^2 A} = 1$ (ii) $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$

13. a) Express f(x) = $\frac{1}{2}(\pi - x)$ as a fourier series with period 2π to be valid in the interval 0 to 2π.

(OR)

b) Find the fourier series of the function $f(x) = \begin{cases} x & in \ (0,\pi) \\ 2\pi - x & in \ (0,2\pi) \end{cases}$

14. a) If $\phi(x,y,z) = x^2 y + y^2 x + z^2$ find $\nabla\phi$ at the point (1,1,1).

(OR)

b) If $\vec{F} = xz^3\hat{i} - 2xyz\,\hat{j} + xz\,\hat{k}$ find div $\vec{F}$ and curl $\vec{F}$ at (1,2,0).

15. a) If $\vec{F} = 3xy\,\vec{i} - y^2\,\vec{j}$, evaluate $\int_c \vec{F}.d\vec{r}$ where C is the curve on the xy plane y=2x^2 from(0,0) to (1,2).

(OR)

b) Find $\int_c \vec{F}.d\vec{r}$ where $\vec{F} = z\vec{i} + x\vec{j} + y\vec{k}$ along the area of the curve $\vec{r} = \cos t\vec{i} + \sin t\vec{j} + t\vec{k}$ from t=0 and t=2π

SECTION – C (4X10=40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.

(16 th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Qn.NO :17 to 21)

16. Evaluate $\iint_s \vec{F}.\vec{n}\,ds$ where $\vec{F} = yz\,\vec{i} + zx\,\vec{j} + xy\,\vec{k}$ and S is the part of the surface of the sphere $x^2+y^2+z^2=1$ which lies in the first octant.

17. Expand $\sin^3\theta\cos^5\theta$ in series of sines of multiples of θ.

18. Separate into real and imaginary parts of tanh(1+i).

19. Show that $x^2 = \frac{\pi^3}{3} + 4\sum_{n=1}^{\infty}(-1)^n\frac{\cos nx}{n^2}$ in the interval $-\pi < x < \pi$ deduce that

(i) $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - ...... = \frac{\pi^2}{12}$ (ii) $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} - ...... = \frac{\pi^2}{6}$ (iii) $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} - ...... = \frac{\pi^2}{8}$

20. Show that $\vec{F} = (y^2 - z^2 + 3yz - 2x)\hat{i} + (3xz + 2xy)\hat{j} + (3xy - 2xz + 2z)\hat{k}$ is irrotational and solenoidal

21. Evaluate $\iiint_V \Delta.\vec{F}$ dV if $\vec{F} = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$ and if V is the volume of the region enclosed by the cube $0 \le x \le 1$, $0 \le y \le 1, 0 \le z \le 1$.

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