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

(NO.OF PAGES: 2)

16 UMS 510 / 16 UMA 510

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER -2018

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

V SEMESTER **TIME: 3 HOURS**

PART - III

REAL ANALYSIS-I

SECTION – A (10X1=10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. The function $f:[0,2\pi] \to [-1,1]$, defined by $f(x) = \sin x$ is _______________.
   a. one –to-one b. on to c. bijection d. cannot be defined

2. The sequence 1,1,1… has the limit____________.
   a. 0 b. 1/2 c. 1 d. 1/4

3. If $\{S_n\}_{n=1}^{\infty}$ is divergent sequence then $\{-S_n\}_{n=1}^{\infty}$ is _______________.
   a. convergent b. monotone c. divergent d. oscillating

4. $1 + \frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!}$ ... is _______.
   a.Alternating series b. Convergent series c. divergent series d.none

5. In metric space, the distance between two distinct points are___________.
   a.Strictly determinable b. Strictly positive c.Strictly indeterminable d. negative

SHORT ANSWERS.

6. Define Function.
7. Define Oscillate sequence.
8. Define Cauchy sequence.
9. Define alternating series with example.
10. Define Metric space .

SECTION – B (5X5=25 MARKS)

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

11. a. Prove that the inverse image of the union of two sets is the union of the inverse images.

(OR)

b. Define i)one-one function ii)onto function.

12.a. Define i) Sequence ii) Subsequence with examples.

(OR)

b. Prove that $\{n\}_{n=1}^{\infty}$ does not have a limit.

(CONTD…..2)

13. a. If $\{s_n\}_{n=1}^{\infty}$ and $\{t_n\}_{n=1}^{\infty}$ are sequence of real numbers that diverge to infinity then prove that their sum and product diverge to infinity.

(OR)

b. If the sequence of the real numbers $\{s_n\}_{n=1}^{\infty}$ converges then prove that $\{s_n\}_{n=1}^{\infty}$ *is* a Cauchy Sequence.

14. a. If $\sum_{n=1}^{\infty} a_n$ converges to A and $\sum_{n=1}^{\infty} b_n$ converges to B then prove that $\sum_{n=1}^{\infty}(a_n + b_n)$ is converges to A+B.

(OR)

b. If $\sum_{n=1}^{\infty} a_n$ converges absolutely then prove that $\sum_{n=1}^{\infty} a_n$ convergent.

15. a. If $\lim_{x\to a} f(x) = L \text{ and } g(x) = M$ then prove that $\lim_{x\to a}[f(x) + g(x)]$=L+M

(OR)

b. Define (i) Strictly decreasing (ii) Strictly increasing.

SECTION – C (5X8=40 MARKS)

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

16.a. Prove that the set of all rational numbers is countable.

(OR)

b. If $A_1, A_2 \ldots\ldots$ are countable sets , then prove that $\bigcup_{n=1}^{\infty} A_n$ is countable.

17.a. If $\{S_n\}_{n=1}^{\infty}$ is a sequence of non-negative numbers and if $\lim_{n\to\infty}(S_n) = L$ then prove that L≥0.

(OR)

b. If the sequence of real numbers $\{S_n\}_{n=1}^{\infty}$ is convergent to L, then prove that $\{S_n\}_{n=1}^{\infty}$ cannot also convergent to a limit distinct from L.

18.a. If $\{s_n\}_{n=1}^{\infty}$ is a convergent sequence of real numbers then prove that $\lim_{n\to\infty} Sup\ s_n = \lim_{n\to\infty} s_n$.

(OR)

b. If $\{s_n\}_{n=1}^{\infty}$ and $\{t_n\}_{n=1}^{\infty}$ are bounded sequences of real numbers and if $s_n \le t_n$ prove that $\lim_{n\to\infty} Sup\ s_n \le \lim_{n\to\infty} Sup\ t_n, and \lim_{n\to\infty} inf\ s_n \le \lim_{n\to\infty} \inf\ t_n$.

19.a. If $\sum_{n=1}^{\infty} a_n$ is convergent series, then prove that $\lim_{n\to\infty} a_n$=0.

(OR)

b. Prove that the series $\sum_{n=1}^{\infty} \frac{1}{n}$ is divergent.

20.a. Discuss about the two examples of metric spaces.

(OR)

b. Let <M, ρ > be a metric space and let 'a' be point in M. Let f and g be a real valued functions whose domains are subsets of M, if $\lim_{x\to a} f(x) = L \text{ and } \lim_{x\to a} g(x) = N$ then prove that $\lim_{x\to a}[f(x)\, g(x)]$=LN

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

(NO.OF PAGES: 2)

16 UMS 512 / 16 UMA 512

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER -2018

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

V SEMESTER | **TIME: 3 HOURS**

PART-III

THEORY OF NUMBERS

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. 1+3+5+…….(2n-1) is____________.
   a. n b. n^2 c. 2n d. 2(n+1)

2. If S={4,5,6} then the two combinations of S are ____________.
   a. (4,5),(4,6),(5,4) b. (4,5),(4,6),(5,6) c. (5,4),(4,6),(5,6) d. (4,5),(6,4),(5,4)

3. If g.c.d (3,2275) is_______________.
   a.1 b.0 c. 2 d.4

4. $1+\phi(p)+\phi(p^2)+\ldots\ldots+\phi(p^n)=$________________.
   a. p^{n-1} b. p^{n+1} c. p^n d. $p\text{-}^n$

5. If n≠m then g.c.d(ϕ_n,ϕ_m) =__________________.
   a.0 b.1 c.2 d.-1

SHORT ANSWERS.

6. Define relatively prime.
7. Define r combination
8. Define Inverse modulo.
9. Write Mobius Inversion formula
10. Define mutually incongruent.

SECTION – B (5X5=25 MARKS)

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

11. a. If m and n are positive integers and if >1, then prove that prove that $n<m^n$.

(OR)

b. State and prove Euclid's division lemma.

12. a. Prove that $1+\binom{n}{2}+\binom{n}{4}+\cdots=2^{n-1}$ and that $\binom{n}{1}+\binom{n}{3}+\binom{n}{5}\ldots=2^{n-1}$

(OR)

b. If S={4,5,6}, then find i) 2 permutation ii) 3-permutation of this set.

(CONTD…..2)

13. a. State and prove Euler's theorem.

(OR)

b. Explain Linear congruence with example.

14. a. Find the value of d(120) .

(OR)

b. Prove that ϕ(n),d(n),σ(n) and μ(n) are multiplicative arithmetic functions.

15. a. If 'a' belongs to the exponent 'h' modulo m, and $a^r \equiv 1(mod\ m)$, prove that h/r.

(OR)

b. If g is primitive root modulo m, then prove that g^r is a primitive root modulo m iff g.c.d {r,ϕ (m)}=1.

SECTION – C (5X8=40 MARKS)

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

16. a. State and prove Basic Representation theorem.

(OR)

b. State and prove fundamental theorem of Arithmetic.

17. a. Find the integers x such that
(i)5x ≡ 4(mod 3) (ii) 7x ≡ 6(mod 5) (iii)9x ≡ 8(mod 7)

(OR)

b. If s different integers $r_1, r_2, \ldots\ldots r_s$ from a complete residue system mod m, then prove that s=m.

18. a. Prove that the congruence (m-1)! ≡ -1 (mod m) iff m is a prime.

(OR)

b. If f(x) is a polynomial of degree n with integral co-efficient and if p is a prime belongs to $p+a_0$ then prove that the congruence f(x)≡0(mod p) has almost n mutually incongruent solutions modulo p.

19. a. If one of the functions in the Mobius pair {f(n),g(n)} is multiplicative, prove that the other function is also multiplication.

(OR)

b. If two arithmetic function f(n)&g(n) satisfy one of the two conditions $f(n) = \sum_{d/n} g(d)$ & $g(n) = \sum_{d/n} \mu(d) f\left(\frac{n}{d}\right)$for each n, then, prove that $f(n)$& $g(n)$ satisfy both conditions.

20. a. For each prime p, Prove that there exist primitive roots modulo p.

(OR)

b. Prove that $\frac{\log 2}{4} . \frac{x}{\log x} < \pi(x) < 30(\log 2)\frac{x}{\log x}$, for $x \geq 8$.

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16 UMS 509 / 16 UMA 509

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N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER -2018

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

V SEMESTER **TIME: 3 HOURS**

PART - III

MODERN ALGEBRA

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. The null set is a ______of every set.
   a. proper set b. subset c. whole set d. none of these
2. A subgroup N of G is said to be a normal subgroup of G if for every $g \in G$ and $n \in N$, ___________.
   a. $gn^{-1} \in N$ b. $gng^{-1} \in G$ c. $gng^{-1} \in N$ d. none of these
3. Kernel of any homomorphism is ___________.
   a. empty b. non-empty c. kernel d. none of these
4. A ring is said to be a ____ if its non zero elements form a group under multiplication.
   a. division ring b. commutative ring c) polynomial ring d) none of these
5. If U is an ideal of R and , then ________.
   a. $U \neq R$ b. $U = R$ c. $U \cong R$ d. none of these

SHORT ANSWERS.

6. Define Cartesian product of two sets A and B.
7. When will we say ‘a’ is congruent to ‘b’ mod H for $a, b \in G$?
8. State Cayley theorem.
9. State pigeonhole principle.
10. Define two sided ideal of a ring R.

SECTION – B (5 X 5 = 25 MARKS)

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

11. a. Prove that the distinct equivalence class of an equivalence relation on A provide us with a decomposition of A as a union of mutually disjoint subsets.

(OR)

b. Prove that the relation congruence modulo n defines an equivalence relation on the set of integers and also prove that this equivalence relation has n distinct equivalence classes.

(CONTD……….2)

12. a. Prove that the relation $a \equiv b \bmod H$ is an equivalence relation.

(OR)

b. If G is a finite group and $a \in G$, then prove that o(a)|o(G).

13. a. If ϕ is a homomorphism of G into $\bar{G}$ with kernel K, then prove that K is a normal subgroup of G.

(OR)

b. Prove that every group is isomorphic to subgroup of A(S) for some appropriate S.

14. a. Give an example of an integral domain which has an infinite number of elements, yet is of finite characteristic.

(OR)

b. If ϕ is a homomorphism of R into R' with kernel $I(\phi)$, then prove the following.

(i). $I(\phi)$ is a subgroup of R under addition.

(ii). If $a \in I(\phi)$ and $r \in R$ then both ar and ra are in $I(\phi)$.

15. a. Prove that the intersection of two left-ideals of R is a left ideal of R,

(OR)

b. Let R be the ring of integers and U be an ideal of R which consists of all the multiples of a fixed integer n_0. What values of n_0 lead to maximal ideals?

SECTION – C (5 X 8 = 40 MARKS)

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

16. a. The Symmetric difference of A & B is defined as $(A - B) \cup (B - A)$.
Prove that the symmetric difference **of** A and B equals $(A \cup B) - (A \cap B)$.

(OR)

b. If a and b are relatively prime, then find integers m and n such that ma+nb=1.

17. a. If G is a group, then prove the following.

(i). The identity element of G is unique

(ii). Every $a \in G$ has a unique inverse in G

(iii). For every $a \in G$, $(a^{-1})^{-1} = a$.

(iv). For all $a, b \in G$, $(a.b)^{-1} = b^{-1}.a^{-1}$.

(OR)

b. If H and K are finite subgroups of G of orders o(H) and o(K), respectively, then prove that $o(HK) = \dfrac{o(H)o(K)}{o(H \cap K)}$.

18. a. State and prove Sylow's theorem for abelian groups.

(OR)

b. If Gis a finite group, then prove that $C_a = o(G) \mid o(N(a))$.

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

(OR)

b. Prove that the homomorphism ϕ of R into R' is an isomorphism if and only if $I(\phi) = 0$.

20. a. If U is an ideal of the ring R, then prove that R/U is a ring and is a homomorphic image of R.

(OR)

b. Prove that every integral domain can be imbedded in a field.

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(NO.OF PAGES:4)

16 UMS 511 / 16 UMA 511

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N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER -2018

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

V SEMESTER TIME: 3 HOURS

PART - III

OPERATIONS RESEARCH - II

SECTION – A **(10 X 1 = 10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. If two person Zero-sum game the value of game can be______________.
   a. determined only if the pay of matrix has a saddle points
   b.positive, negative or zero c. determined only if the game is fair d. none of the above
2. A sequencing problem involving six jobs ang three machines requires evaluation of______.
   a. (6!+6!+6!) sequences b. $(6!)^3$ sequences
   c. (6X6X6) sequences d. (6+6+6) sequences
3. The setup cost to be_________ of the quantity.
   a. dependent b. independent c. production d. stored
4. Total amount of shortage over time period t is ______.
   a. $\frac{1}{2}Q_2t_2$ b. $\frac{1}{2}Q_1t_1$ c. $\frac{1}{2}Q_1t_2$ d. $\frac{1}{2}Q_2t_1$
5. An activity represented by an_________.
   a. time b. circle c. arrow d. rectangle

SHORT ANSWERS.

6. When the pay of matrix of a game is transposed ?
7. What is an idle time on a machine ?
8. Define order cycle
9. Write Total Optimum inventory cost
10. What is meant by dummy activity?

SECTION – B **(5 X 5 = 25 MARKS)**

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

11 a. For the game with the following pay of f matrix, determine the optimum strategies and the value of the game

$$\begin{array}{cc} & p_2 \\ p_1 & \begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix} \end{array}$$

(OR)

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

b. Determine the value of the game $\begin{array}{cc} & A \\ B & \begin{bmatrix} 6 & -3 \\ -3 & 0 \end{bmatrix} \end{array}$

12.a. In a factory, there are six jobs to process, each of which should go to machines. A & B in the order AB. The processing timings in minutes are given determine the optimal sequencing & total elapsed time.

Jobs	1	2	3	4	5	6
Machine A	7	4	2	5	9	8
Machine B	3	8	6	6	4	1

(OR)

b. A machine operator has to perform 3 operations. Turning, Threading & Knurling on three machined AB & C in the order ABC. Find the optimum sequence when the time in hours are given.

Job	1	2	3	4	5	6
Turning A_i	3	12	5	2	9	11
Threading B_i	8	6	4	6	3	1
Knurling C_i	13	14	9	12	8	13

13.a. An oil engine manufacturer purchase Lubricants at the rate of Rs 42 per piece from a vendor. The requirement of these lubricants is 1800 per year. What should be the order quantity per order. If the cost per placement of an order in Rs 16 and order. If the cost per placement of an order is 16 and inventory carrying charge per rupee per year in only 20 paise.

(OR)

b. Neon lights in an industrial park are replaced at the rate of 100 units perday. The physical plant orders the neon lights periodically. It cost Rs100 to initiate a purchase order. A neon light kept in storage is estimated to cost about Re. 0.02 per day. The lead time between placing and receiving an order in 12 days determine the optimum inventory policy for ordering the neon lights.

14.a. The demand for an certain item is 16 units per period. Unsatisfied demand causes a shortage cost of Re 0.75 per unit per shortage period. The cost of initiating purchasing action is Rs 15 per purchase and the holding cost is 15% of average inventory valuation per period. Iteam cost is Rs 8.per unit. Find the minimum cost purchase quantity.

(OR)

b. Find the optimum order quantity for a product for which the price breaks are as follows.

Quantity	Unit cost(Rs)
$0 \le Q_1 \le 500$	10.0
$500 \le Q_2$	9.25

The monthly demand for the product is 200 units, the cost of storage is 2% of the unit cost and the cost of ordering is Rs 350.

15.a. Explain the Rules of Network construction.

(OR)

b. Draw a network diagram for the following relevant data are given below.

Activity	A	B	C	D	E	F	G
Preceding activity	-	-	-	A,B	A,B	C,D,E	C,D,E

(CONTD.......3)

SECTION – C **(5 X 8 = 40 MARKS)**

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

16.a. Solve 2-person zero-sum game

$$\begin{array}{cc} & player\ B \\ player\ A & \begin{bmatrix} 15 & 2 & 3 \\ 6 & 5 & 7 \\ -7 & 4 & 0 \end{bmatrix} \end{array}$$

(OR)

b. Solve graphically by the following 2 x 4 game.

$$\begin{array}{ccc} & & player\ B \\ & & \begin{array}{cccc} B_1 & B_2 & B_3 & B_4 \end{array} \\ player\ A & \begin{array}{c} A_1 \\ A_2 \end{array} & \begin{bmatrix} 2 & 1 & 0 & -2 \\ 1 & 0 & 3 & 2 \end{bmatrix} \end{array}$$

17.a. Determine the optimal sequence of performing 5 jobs on 4 machines.The machining of each jobs in required in the order ABCD and the processing timings are as follows.

	Machine			
Job	A	B	C	D
1	8	3	4	7
2	9	2	5	5
3	6	4	5	8
4	12	5	2	9
5	7	1	3	3

(OR)

b. Using graphical method, calculate the minimum time needed to process job 1 and 2 on fire machines A,B,C,D and E.

	Machine				
Job 1	A	B	C	D	E
	6	8	4	12	4
Job 2	B	C	A	D	E
	10	8	6	4	12

18.a. A manufacturing company purchases 9000 parts of a machine for its annual requirements ordering one month usage at a time. Each part cost Rs 20 the ordering cost per order is Rs 15 and the carrying charges are 15% of the average inventory per year you have been assigned to suggest a more economical purchasing policy for the company. What advice would you offer and how much would it save the company per year.

(OR)

b. Explain the concept of EOQ.

(CONTD.......4)

19.a. Find the optional order quantity for a product for which the price breaks are as follows.

Quantity	Unit cost(Rs)
$0 \le Q_1 < 500$	10.0
$500 \le Q_2 < 750$	9.25
$7500 \le Q_3$	8.75

The monthly demand for the product is 200 units, the cost of storage is 2% of the unit cost and the cost of ordering is Rs 350.

(OR)

b. A contractor has to supply 10000 bearings per day to an automobile manufacturer, He finds that when he starts a production run he can produce 25000 bearing per day. The cost of holding a bearing in stock for one year is Rs 2 and the set-up cost of a production run is Rs 1800. How frequently should production run be made?

20.a. A small project consists of seven activities for which the relevant data are given below.

Activity	Preceding activities	Activity duration(Days)
A	-	4
B	-	7
C	-	6
D	A,B	5
E	A,B	7
F	C,D,E	6
G	C,D,E	5

(i) Draw the network and find the project completion time.

(ii) Calculate total float for each of the activities and highlight the critical path.

(OR)

b. Distinction between PERT and CPM.

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16 UMS 513 / 16 UMA 513

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V SEMESTER **TIME: 3 HOURS**

PART - III
PROGRAMMING IN C

SECTION – A **(10 X 1 = 10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. An integer constant refers to a sequence of _______.

   a. digits b. Characters c. space d. None of the above

2. " if" statement is ______statement.

   a. control b. Expression c. application d. None the above

3. if student[30][15] then the length of the character is ______.

   a. 30 b. 15 c. 10 d. 20

4. Any number of arguments can be passed to a function

   a. two b. three c. four d. unlimit

5. Pointer is a ___________.

   a. constant b. Variable c. functions d. None of these

SHORT ANSWERS.

6. Define constant.
7. Write general form of if else statement.
8. Write general form of string comparison function.
9. Write syntax of declaring pointer variable.
10. Write general form of an pointer.

SECTION – B **(5 X 5 = 25 MARKS)**

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

11. a. Explain integer constant.

(OR)

   b. Short note on increment operators

12. a. Explain nested if...... else statement.

(OR)

   b. Explain go....to statement.

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

13.a. Explain one dimensional array.

(OR)

b. How to declare and initializing string variables?

14. a. Explain functions but no return values.

(OR)

b. Define function declaration with give an example.

15.a. Explain pointer expressions.

(OR)

b. Explain pointer declaration styles

SECTION – C **(5 X 8 = 40 MARKS)**

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

16.a. How many data types does C language consist? Explain briefly.

(OR)

b. Explain all types of operator available in C with example.

17.a. Explain do ..while statement with an example.

(OR)

b. Explain switch statement.

18.a. Explain string handling function.

(OR)

b. Write a program using single subscripted variable to evaluated the following expression. $Total = \sum_{i=1}^{10} x_i^2$.

19. a. Write a brief note on string handling functions.

(OR)

b. Explain handling of non integer functions.

20.a. Write a program using pointers to compute the sum of all elements stored in an array.

(OR)

b. Explain about array of pointers.

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(NO.OF PAGES: 3)

17 UMA 3A3

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

III SEMESTER **TIME: 3 HOURS**

PART – III

FINANCIAL ACCOUNTING

SECTION – A **(10 X 1 = 10 MARKS)**

ANSWER ALL THE QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. The receiving aspect in a transaction is called as___________.
   (a)Debit aspect (b)Credit aspect
   (c) Receiving aspect (d) Cash aspect
2. Profit and Loss account is prepared to findout___________.
   (a) Gross profit or loss (b) Net profit or loss
   (c) Financial position (d) Capital
3. From which account we can get the information of credit purchases?
   (a) Sundry Creditors (b) Sundry Debtors
   (c) Bills payable (d) Bills receivable
4. A Branch which does not maintain its own set of books called___________.
   (a) Dependent branch (b) Independent branch
   (c) Simple branch (d) Head office
5. Under this method, depreciation is charged evenly every year throughout the effective life of an asset___________.
   (a) Straight line method (b) Diminishing balance method
   (c) Written down value method (d) None of these

SHORT ANSWERS.

6. What is a Journal?
7. What do you mean by Fixed assets ?
8. What is Single Entry system?
9. What is Independent branch?
10. Define Depreciation.

SECTION – B **(5 X 5 = 25 MARKS)**

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

11. a. Explain objectives of Accounting.

(OR)

b. Explain the objectives of preparing Trial Balance.

(CONTD……2)

12. a. Prepare Trading Account for the year ending 31st March 2018 from the following information.

Opening stock	Rs. 1,00,000	Purchases return	Rs. 25,000
Sales	Rs.4,00,000	Direct Expenses	Rs. 10,000
Purchases	Rs. 1,50,000	Carriage inward	Rs. 5,000
Closing stock	Rs. 50,000		

(OR)

b. Calculate Net Profit from the following:

	Rs.
Purchases (200 units)	10,000
Freight and carriage	1,200
Rent and advertising	600
Sales (150 units)	10,800

13. a. Calculate the capital at the beginning of the year

	Rs.
Capital at the end	35,000
Drawings	5,000
Profit	10,000
Capital introduced during the year	2,500

(OR)

b. From the following information, calculate Purchases:

	Rs.
Cost of goods sold	4,00,000
Opening stock	50,000
Closing stock	60,000

14. a. The Kanpur Shoe company opened a branch at Delhi in 2017. From the following particulars prepare Delhi branch account for the year 2017.

	Rs.
Goods sent to Branch	15,000
Cash sent to branch for expenses	6,000
Cash received from Branch	24,000
Closing stock on 31-12-2017	2,300
Petty cash balance on 31-12-2017	40

.

(OR)

b. From the following particulars, calculate Closing balance of Branch Debtors:

	Rs.
Branch Debtors (1-1-2017)	6,300
Credit Sales	39,000
Cash received from debtors	41,200

15. a. A firm purchased a machine for Rs.1,00,000 on 1-7-2015. Depreciation is written off at 10% on reducing balance method. The firm closes its books on 31st December each year. Show the Machinery Account upto 31-12-2017.

(OR)

b. Calculate Loss on sale of Machinery under straight line method from the following information.

Original cost of Machinery on 1-1-2015	Rs.3,00,000
Rate of Depreciation	5%
Date of sale of Machinery	1-7-2017
Sale value of Machinery	Rs.50,000

SECTION – C (4X10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Qn. No: 17 To 21)

16. Discuss the various Accounting Concepts with suitable examples.

17. Discuss the Accounting Conventions.

18. The following information was extracted from the books ofAravind & Co. Prepare Trading Account, Profit and Loss Account and Balance Sheet at 31.12.2017.

	Rs.		Rs.
Credit Balances:			
Capital	72,000	Postage	546
Creditors	17,440	Bad debts	574
Bills payable	5,054	Interest	2,590
Sales	1,56,364	Insurance	834
Loan	24,000	Machinery	20,000
Debit Balances:		Stock (1-1-2017)	19,890
Debtors	7,770	Purchases	1,24,184
Salaries	8,000	Wages	8,600
Discount	2,000	Buildings	47,560
		Furniture	32,310

Value of Closing Stock Rs.28,600

19. From the following particulars, prepare Bills receivable account and Total Debtors Account for the year ended 31-12-2017:

	Rs.
Total Debtors on 1-1-2017	36,000
Bills Receivable on 1-1-2017	10,000
Sales (including cash sales Rs.20,000)	3,00,000
Cash received from Debtors	2,00,000
Bills Receivable on 31-12-2017	15,000
Returns inwards	15,000
Discount allowed to Debtors	10,000
Bad Debts written off	3,000
Bills receivable endorsed to creditors	10,000
Cash received on bills matured	15,000

20. On January 1, 2017 the goods invoiced by Bombay Head Office of a trader to its Madras Branch were Rs.96,000 at selling price, being 331/3 percent above cost price. For 6 months ended June 30, 2017, the branch return showed that the sales were Rs.58,000. The goods invoiced at Rs.4,000 were returned by the Branch to the head office. The closing stock at Madras Branch on June 30, 2017 was Rs.33,600 at selling price. There was no opening stock at the Branch.
Prepare Branch Stock A/c, Branch Adjustment A/c and Goods Sent to Branch A/c in Bombay Head Office Books.

21. Machinery was purchased on 1-1-2016 for Rs.40,000. On 30th June, anonther second hand machine was purchased for Rs.15,000 and Rs.5,000 was spent for repairs. On 30th June 2017 the second machine was sold for Rs.15,000. Prepare Machinery account after allowing depreciation of 10% p.a. on the written down value.

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

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17 UMS 305 / 17 UMA 305

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER -2018

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

III SEMESTER **TIME: 3 HOURS**

PART – III

DYNAMICS

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

ANSWER THE FOLLOWING QUESTION.

MULTIPLE CHOICE QUESTIONS.

1. The time of flight of an object of the projectile is ___________________.
   a. $\frac{2u \sin\alpha}{g}$ b. $\frac{2g \sin\alpha}{u}$ c. $\frac{2\alpha \sin\alpha}{g}$ d. $\frac{2g \sin\alpha}{\alpha}$
2. The_____ of the oscillation is the number of complete oscillations that the particle makes in one second.
   a. Period b.SHM c. Frequency d. displacement
3. The magnitude of the resultant velocity of P is______________.
   a.$\sqrt{r+(r\theta)^2}$ b. $\sqrt{\dot{r}^2+(r.\theta)^2}$ c. $\sqrt{\dot{r}^2+(r\dot{\theta})^2}$ d. $\sqrt{\dot{r}(r\dot{\theta})^2}$
4. The muzzle velocity and recoil of a gun is_______________.
   a.$MV = mv$ b. $Mv = mV$ c. $MV \neq mv$ d. M/V=m/v
5. The property of a solid body to recover its shape is called _______________.
   a.Plasticity b.elasticity c. metallic d. ice.

SHORT ANSWERS.

6. Under what condition the horizontal range is maximum for a given velocity of projection?
7. Give an example for simple Harmonic motion.
8. Write the polar equation of an equiangular spiral.
9. What is principal of Conservation of Linear momentum?
10. State Newton's Experimental law?

SECTION-B **(5X5=25 MARKS)**

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

11 a. Show that the time of flight of a projectile is twice the time taken to reach the highest point.

(OR)

b. A stone is thrown with a velocity of 39.2m/sec at 30° horizontal. Find at what times it will be at a height of 14.7m(g=9.8m/sec^2).

12 a. Derive the equation of the composition of two SHMs of the same period is two perpendicular directions.

(OR)

b. Show that the energy of a system executing SHM is proportional to the square of the amplitude and of the frequency.

13.a. Write the Pedal Equations of a Circle-Pole at any point.

(OR)

b. Derive the formula in polar co-ordinates for perpendicular from the pole on the tangent.

14.a. Write in detail about the motion of a shot and Gun. How the shot and recoil are related?

(OR)

b. A jet of water leaves a nozzle of 3cm diameter of a speed of 2m/sec and impinges normally on a plane inelastic wall so that the velocity of the water is destroyed on reaching the wall. Calculate in gm weight the thrust on the wall.

15.a. Derive the formula of impact of a smooth sphere on a fixed smooth plane.

(OR)

b. A ball is thrown from a point on a smooth horizontal ground with a speed V at on angle α to the horizon. If e be the co-efficient of restitution, show that the total time for which the ball rebounds on the ground in $\frac{2V\, sin\alpha}{g(1-e)}$.

SECTION – C (4X10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Qn. No: 17 To 21)

16. A shell bursts on contact with the ground and places from it fly in all directions with the velocity upto 30 per sec. Show that a man 30m away is in danger for 5 sec nearly.

17. If the dipslcement of a moving point at any time be given by an equation of the form $x = a\, cos\omega t + bsin\omega t$. Show that the motion is a SHM.

18. A particle moves in a plane with an acceleration which is always directed to a fixed point O in the plane. Obtain the differential equation of its path.

19. 8cm of rainfall occurs in a certain district in 24 hrs. Assuming the drops fall freely from a height of 109meters, find the pressure on the ground/sq.kms of the district.

20. Two spheres of masses $m_1$and m_2 moving with the velocities u_1 and u_2 at angles α_1 and α_2 with their line of centres, come into collision.Find an expression for the loss of kinetic energy.

21. Derive the general solution of the SHM equations.

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

(NO.OF PAGES: 3)

17 UMS 306 / 17 UMA 306

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER -2018

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

III SEMESTER **TIME: 3 HOURS**

PART – III

NUMERICAL TECHNIQUES

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. In the case of bisection method, the convergence is ______________.
   a. linear b. quadratic c. very rapid d. none of these
2. The first two terms of the interpolation formula will give the ____________.
   a. linear interpolation b. parabolic interpolation
   c. elliptic interpolation d. none of these
3. Stirling's formula is just the ___________ of the Gauss formula.
   a. difference b. average c. particular case d. none of these
4. Error in the Trapezoidal rule is of order ___________.
   a. h^3 b. h^2 c. h d. none of these
5. A particular case of Runge-Kutta method of second order is_________________.
   a. Taylor's method b. Picard's method
   c. modified Euler's method d. none of these

SHORT ANSWERS.

6. State Newton-Raphson formula for iteration.
7. Define the term extrapolation.
8. Write the formula that we use to get $\left(\frac{dy}{dx}\right)_{x=x_0}$ using Newton's forward difference interpolation formula.
9. State Simpson's one third rule.
10. Write down the iteration formula for y in solving $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$ due to Euler's method .

SECTION – B (5 X 5 =25 MARKS)

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

11. a. Find the positive root of the equation $x^3 - x = 1$ by bisection method .

(OR)

b. Find a real root of the equation $x^3 - 2x - 5 = 0$ by False position method.

(CONTD………2)

12. a. Find a polynomial of degree four which takes the values

x	2	4	6	8	10
y	0	0	1	0	0

(OR)

b. Find the missing value of the the table given below. What assumption have made to find it?

year	1917	1918	1919	1920	1021
Exports in tons	443	384	-	397	467

13. a. The population of a certain town is given below. Find the rate of growth of the population in 1931.

year	1031	1941	1951	1961	1971
population	40.62	60.80	79.95	103.56	132.65

(OR)

b. The table below gives the results of an observation. θ is the observed temperature in degrees centigrade of a vessel of cooling water, t is the time in minutes from the beginning of the observation. Find the approximate rate of cooling at t = 3 and 3.5.

t	1	3	5	7	9
θ	85.3	74.5	67.0	60.5	54.3

14. a. Using Trapezoidal rule evaluate $\int_0^1 \frac{1}{1+x^2}dx$ with h = 0.2 from the following table. Hence obtain an approximate value of π .

(OR)

b. Evaluate $\int_0^1 \frac{6}{1+x}dx$ using Simpson's one third rule. Also check up by direct integration.

15. a. Using Euler's method solve numerically the equation $\frac{dy}{dx} = x + y$, y(0) = 1 for x = (0.0)(0.2)(1.0) and check your answer with the exact solution.

(OR)

b. Solve the equation $\frac{dy}{dx} = 1 - y$, given y(0) =0 using modified Euler's method and tabulate the solutions at x =1 and 0.2.

SECTION – C (4X10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Qn. No: 17 To 21)

16. Using improved Euler method find y at x = 0.1 and y at x = 0.2, given that

$\frac{dy}{dx} = y - \frac{2x}{y},\ y(0) = 1$.

17. Find an iterative formula to find $\sqrt{N}$ where N is a positive number and hence find $\sqrt{5}$.

18. The population of a town during the last six census is as follows. Estimate the increase in the population during the period 1946 to 1976 .

Year	19411	1951	1961	1971	1981	1991
Population (in thousands)	20	24	29	36	46	51

19. Find the gradient of the road at the middle point of the elevation above a datum line of seven points of a road are given below.

X	0	300	600	900	1200	1500	1800
Y	135	149	157	183	201	205	193

20. When a train is moving at 30 metres per second steam is shut off and breaks are applied. The speed of the train in metres per second after t seconds is given by the following table. Using the Simpson's rule determine the distance moved by the train in 40 seconds.

Time(t)	0	5	10	15	20	25	30	35	40
Speed(v)	30	24	19.5	16	13.6	11.7	10.0	8.5	7.0

21. Apply Runge-Kutta method of second order to find y(0.2), given that

$$\frac{dy}{dx} = x + y \,;\, y(0) = 1 \,.$$

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2018 ONLY)

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18 UMS 1A1 / 18 UMA 1A1

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER -2018

B.Sc.- MATHEMATICS **MAXIMUM MARKS: 75**

I SEMESTER **TIME: 3 HOURS**

PART - III

MATHEMATICAL STATISTICS - I

SECTION – A

ANSWER ALL THE QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. $E(aX+b) =$ _____________ .

   $a)\ aE(X)$ $b)\ aE(X)+b$ $c)\ aE(X)-b$ $d)\ E(X)$.

2. $M_{CX}(t) =$ _______________

   $a)\ M_X(t)$ $b)\ cM_X(t)$ $c)\ M_X(ct)$ $d)\ M(t)$.

3. The mean of the binomial distribution is____________.

   $a)\ n$ $b)\ np$ $c)\ npq$ $d)\ pq$.

4. The Variance of Rectangular distribution is____________.

   $a)\ \frac{b+a}{2}$ $b)\ \frac{b-a}{2}$ $c)\ \frac{(b+a)^2}{12}$ $d)\ \frac{(b-a)^2}{12}$.

5. M.G.F. of a Gamma Distribution is____________.

   $a)(1+t)^{\lambda}$ $b)(1+t)^{-\lambda}$ $c)(1-t)^{-\lambda}$ $d)(1-t)^{\lambda}$.

SHORT ANSWERS.

6. Define Covariance.
7. Define Characteristic function.
8. Define Poisson distribution.
9. Define Normal distribution.
10. Find the mean of exponential distribution.

SECTION – B **(5 × 5 = 25 MARKS)**

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

11. a. State and prove addition theorem of Expectation.

(OR)

b. Find the expectation of the number on a die when thrown.

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

12. a. Find the moment generating function of the random variable whose moments are: $\mu_r' = (r+1)!\,2^r$.

(OR)

b. Prove that $\phi_X(-t) = \overline{\phi_X(t)}$.

13. a. Ten coins are thrown simultaneously. Find the probability of getting at least seven heads by using Binomial distribution.

(OR)

b. Find the moment generating function of the Poisson distribution.

14. a. Find the M.G.F. of Normal Distribution.

(OR)

b. If X is uniformly distributed with mean 1 and variance $\frac{4}{3}$, then find $P\ (X < 0)$.

15. a. Find the mean of Beta Distribution of First kind.

(OR)

b. State and prove additive property of Gamma Distribution.

SECTION – C (4X10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Qn. No: 17 To 21)

16. Let X be random variable with the following probability distribution:

x	-3	6	9
P(X=x)	1/6	1/2	1/3

Find $E(X)$ and $E(X^2)$ and using the laws of expectation, evaluate $E(2X+1)^2$.

17. State and prove Chebychev's inequality.

18. Let the random variable X assume the value r with the probability law:

$P(X = r) = q^{r-1}p; r = 1,2,3,....$ Find the m.g.f. of X and hence its mean and variance.

19. If X is a Poisson Variate such that $P(X = 2) = 9P(X = 4) + 90P(X = 6)$.

Find (i) λ and (ii) the mean of X.

20. Obtain the equation of the normal curve that may be fitted to the following data:

Class	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-100
Frequency	3	21	150	335	326	135	26	4

Also obtain the expected normal frequencies.

21. Drive mean and Variance of exponential distribution.

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2018 ONLY)

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18 UMS 101 / 18 UMA 101

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER -2018

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

I SEMESTER **TIME: 3 HOURS**

PART - III

CLASSICAL ALGEBRA

SECTION – A (10 × 1 = 10 MARKS)

ANSWER ALL THE QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. $(1-x)^{-1} =$ __________.
   $a)\ 1+x+x^2+x^3+\dots$ $b)\ 1-x+x^2-x^3+\dots$
   $c)\ 1+2x+3x^2+\dots$ $d)\ 1-2x+3x^2-\dots$

2. If a polynomial $f(x)$ is divided by $x+a$, then the remainder is ___________.
   $a)\ f(a)$ $b)\ f(-a)$ c) $f(0)$ $d)\ 0$.

3. The equation $x + {}^1/_x = 0$ is ____________.
   a) not a reciprocal equation b) a standard reciprocal equation
   c) a reciprocal equation of first type and odd degree
   d) a reciprocal equation of second type and even degree.

4. The second term of the equation $x^4 + 20x^3 - 143x^2 + 430x + 462 = 0$ will be Removed by diminishing the roots of the equation by ___________.
   a) 5 b) -5 c) $-{}^1/_4$ d) ${}^1/_4$.

5. If$A = \begin{pmatrix} 1+i & 2 \\ 2-i & i \end{pmatrix}$, then the conjugate of A is ________________.

   a) $\begin{pmatrix} 1-i & -2 \\ 2+i & -i \end{pmatrix}$ $b)\begin{pmatrix} 1-i & 2 \\ 2+i & -i \end{pmatrix}$ $c)\begin{pmatrix} 1-i & -2 \\ i-2 & -i \end{pmatrix}$ d) none.

SHORT ANSWERS.

6. Write down the expansion of $\log(1+x)$.

7. What is the other imaginary root of the equation $x^3 - 3x^2 + 4x - 2 = 0$, if one root is $1-i$?

8. Change the equation $2x^4 - 3x^3 + 3x^2 - x + 2 = 0$ into another the coefficient of whose highest term will be unity.

9. If the roots of the equation $4x^5 - 2x^3 + 7x - 3 = 0$ is increased by 2, then find the transformed equation.

10. Find the characteristic equation of the matrix$A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$.

SECTION – B **(5 × 5 = 25 MARKS)**

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

11. a) Find the greatest term in the expansion of $(1-x)^{31/3}$ when $x = \frac{2}{7}$.

(OR)

b) Show that the coefficient of x^n in the infinite series

$$1 + \frac{b+ax}{1!} + \frac{(b+ax)^2}{2!} + \ldots + \frac{(b+ax)^n}{n!} + \ldots \ is\ \frac{e^b a^n}{n!}.$$

12. a) Frame an equation with rational coefficients, one of whose root is $\sqrt{5} + \sqrt{2}$.

(OR)

b) Solve the equation $x^4 + 4x^3 + 5x^2 + 2x - 2 = 0$ which one root is $-1 + \sqrt{-1}$.

13. a) Solve $x^4 - x^3 + 2x - x + 1 = 0$.

(OR)

b) Show that the sum of the eleventh powers of the roots of $x^7 + 5x^4 + 1 = 0$ is zero.

14. a) Find the quotient and remainder when $2x^6 + 3x^5 - 15x^2 + 2x - 4$ is divided by x+5.

(OR)

b) Determine completely the nature of the roots of the equation.
$x^5 - 6x^2 - 4x + 5 = 0$.

15. a) If $A = \begin{pmatrix} -3 & 5 & 6 \\ 1 & 3 & 2 \\ 6 & 7 & 8 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & -2 & -3 \\ 2 & 3 & 4 \\ 5 & 6 & 7 \end{pmatrix}$, then find 2A+3B and A-B.

(OR)

b) Find the sum and product of all eigen values of the matrix $A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 2 \\ 1 & 2 & 3 \end{pmatrix}$.

SECTION – C **(4X10 = 40 MARKS)**

ANSWER ANY FOUR OUT OF SIX QUESTIONS.
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Qn. No: 17 To 21)

16. Sum the series to infinity

$$\frac{1\,.\,4}{5\,.\,10} - \frac{1\,.\,4\,.\,7}{5\,.\,10\,.\,15} + \frac{1\,.\,4\,.\,7\,.\,10}{5\,.\,10\,.\,15\,.\,20} + \ldots$$

17. Sum the series

$$\frac{1^2}{1!} + \frac{1^2+2^2}{2!} + \frac{1^2+2^2+3^2}{3!} + \ldots + \frac{1^2+2^2+\ldots+n^2}{n!} + \ldots$$

18. Solve the equation $81x^3 - 18x^2 - 36x + 8 = 0$ whose roots are in harmonic progression.

19. Solve the equation $6x^5 - x^4 - 43x^3 + x - 6 = 0$.

20. Solve the equation $x^4 + 20x^3 - 143x^2 + 430x + 462 = 0$ by removing its second term.

21. Obtain the eigen values and eigen vectors of $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$.

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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2018 ONLY)

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18 UPS 1A1

REG.NO

NGM COLLEGE (AUTONOMOUS) POLLACHI

END-OF-SEMESTER EXAMINATIONS: NOVEMBER- 2018

B.Sc. PHYSICS **MAXIMUM MARKS: 75**

I SEMESTER **TIME: 3 HOURS**

PART - III

ANCILLARY MATHEMATICS FOR PHYSICS -I

SECTION – A **(10 X1 = 10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.
MULTIPLE CHOICE QUESTIONS.

1. If A is slow Hermitian matrix, then the diagonal element are ________.
   a. Zero b. Imaginary c. Zero or imaginary d. None of these

2. If $\propto, \beta, \gamma$ are the roots of the equation $ax^3 + bx^2 + cx + d + 0$, then product $\propto \beta\gamma$ is __________.
   a. $-b/a$ b. c/a c. d/a d. $-d/a$

3. If we have to form an equation whose roots are increased by h, we have to diminish the roots of the given equation by __________.
   a. h b. - h c. 2h d. -2 h

4. Sum of the odd binomial co- efficient is___________.
   a. 2^n b. 2^{-n} c. 2^{n-1} d.2^{n+1}

5. $\lceil(n+1) =$ _______.
   a. $\lceil n-1$ b. $\lceil n-1$ c. $\lceil n$ d. 0

SHORT ANSWERS.

6. State Cayley's Hamilton Theorem.
7. What can you say about the number of roots of a polynomial equation of n – degree?
8. State any one property of reciprocal equation.
9. Expand $\log_e(1+x)$
10. List out any 2 properties of gamma function.

SECTION – B **(5 X 5 = 25 MARKS)**

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

11.a. If A is a square matrix, show that A+A^*, A^*A are all Hermitian & A-A^* is skew Hermitian.

(OR)

b. Show that the matrix $\frac{1}{3}\begin{bmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{bmatrix}$ is orthogonal.

12.a. Solve the equation x^3-12x^2 + $39x - 28 = 0$ Whose roots are in A.P

(OR)

b. Solve the equation x^4+ $2x^3$ - $5x^2 + 6x + 2 = 0$ given that 1+$\sqrt{-1}$ is a root of it.

(CONTD….2)

13.a. Solve the equation $4x^4$-$20x^3$ + $33x^2 - 20x + 4 = 0$.

(OR)

b. Remove the second tern from the equation x^3-$6x^2$ + $11x - 6 = 0$.

14.a. Sum to infinity the series

$\frac{2.4}{3.6} + \frac{2.4.6}{3.6.9} + \frac{2.4.6.8}{3.6.9.12} + \ldots\ldots\ldots + \infty$.

(OR)

b. Sum to infinity the series

$\frac{x}{1.2} + \frac{x^2}{2.3} + \frac{x^3}{3.4} + \ldots\ldots\ldots\ \infty$.

15.a. Prove that $\Gamma\left(\frac{1}{2}\right)$ = $\sqrt{\pi}$.

(OR)

b. Evaluate $\int_6^{\infty} \frac{x}{1+x^6}\, dx$.

SECTION - C (4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.
(16TH QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Q.NO: 17 TO 21)

16. Find the characteristics equation of the matrix A = $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & 1 \\ 1 & -1 & 2 \end{bmatrix}$ and verify that it is satisfied by A. Also find A^{-1}.

17. Solve the equation x^4-$10x^3$ - $120x^2 - 320x + 1024 = 0$ given that the roots are Real and they form a G.P.

18. Solve: $2x^6$-$9x^5$ + $10x^4 - 3x^3 + 10x^2 - 9x + 2 = 0$.

19. Sum to infinity the series.

$\sum_{n=1}^{\infty} \frac{n^2}{(n+1)(n+2)} x^n$

20. Show that $\int_0^1 \frac{dx}{3\sqrt{1-x^3}}$ = $\frac{2\pi}{3\sqrt{3}}$.

21. Establish the relation: $\beta\,(m,n)$ = $\frac{\Gamma m\,.\Gamma n}{\Gamma(m+n)}$.

A6/- ************

(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2018 ONLY)

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18 UMS 102 / 18 UMA 102

REG. NO.

N.G.M COLLEGE(AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER -2018

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

I SEMESTER **TIME: 3 HOURS**

PART - III

CALCULUS

SECTION-A **(10 X 1 =10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

1. The solution of the equation $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 4y = 0$ is________.
   a. $Ae^{4x} + B\, e^{3x}$ b. $Ae^{x} + B\, e^{4x}$ c. $(A + B)e^{4x}$ d. $Ae^{x} + B\, e^{-x}$
2. The Lagrangian equation in PDE is in the form of _______.
   a. $P^2 + Q^2 = R^2$ b. $Pp + Qq = R$ c. $Pq + Qp = r$ d. $Pp + Qq = 0$
3. Integration may be considered as the ________.
   a. inverse of differentiation b. Integral of differentiation
   c. Quotient of differentiation d. Product of differentiation.
4. The value of $\Gamma(\frac{1}{2})$ is_______.
   a. $\frac{1}{2}$ b. $\sqrt{\frac{1}{2}}$ c. $\sqrt{\pi}$ d. Sin π
5. $L(1) =$_______.
   a. $\frac{1}{s}$ b. $\frac{1}{s^2}$ c. $\frac{2}{s^2}$ d. $\sqrt{\pi}$

SHORT ANSWERS.

6. Find the particular integral of $(D^2 + 5D + 6)y = e^x$.
7. Solve $\frac{\partial^2 z}{\partial y^2} = \sin y$.
8. How will you integrate $\iint_R f(r,\theta)\, r\, dr\, d\theta$?
9. What is J $\left(\frac{u,v}{x,y}\right)$?
10. Find $L(t^2 + 2t + 3)$.

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

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

11. a. Solve $(D^2 - 4D + 3)y = sin3x\, cos2x$.

(OR)

b. Solve $(D^2 + 2D + 5)y = xe^x$.

(CONTD…….2)

12. a. Solve the PDE $\frac{\partial^2 z}{\partial x \partial y} = 0$.

(OR)

b. Solve $q = xp + p^2$.

13. a. Evaluate $\iint xy\, dxdy$ taken over the positive quadrant of the circle $x^2 + y^2 = a^2$.

(OR)

b. By changing the order of integration, evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dxdy$.

14. a. Prove that $\int \int_D e^{-x^2-y^2} dxdy = \frac{1}{4}\pi(1 - e^{-R^2})$ where D is the region $x \geq 0, y \geq 0$ and $x^2 + y^2 \leq R^2$

(OR)

b. Solve $\int_0^\infty e^{-x^2} dx$.

15. a. Find $L(te^{-t} sint\ )$.

(OR)

b. Find $L^{-1}\left[\frac{s}{(s^2-1)^2}\right]$.

SECTION – C (4X10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Qn. No: 17 To 21)

16. Solve $x^2 \frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + y = \frac{1}{(1-x)^2}$

17. Solve $p^2 + q^2 = npq$.

18. Evaluate $\iiint xyz\ dxdydz$ taken through the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$.

19 . Evaluate $\iint_R (x-y)^4 e^{x+y} dxdy$ Where R is the square with vertices (1,0)(2,1)(1,2) and(0,1).

20. Evaluate (i) $\int_0^\infty \frac{e^{-t}-e^{-2t}}{t}\ dt$ (ii) $L^{-1}\left(\frac{s}{s^2a^2+b^2}\right)$.

21. Solve $x^2 \frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \frac{\log x \sin(\log x)+1}{x}$

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