



THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

MATHEMATICS FOR COMPETITIVE EXAMINATIONS

MAT / MAS 2213 / 3231

TIME: 3 Hour

TOTAL: 60 Marks

PART A

Answer any FOUR Questions:

4 × 15 = 60

- (i). Find the unit's digit in $(264)^{102} + (264)^{103}$.

(ii). If $2x + 3y + z = 55$, $x + z - y = 4$ and $y - x + z = 12$, then what are the values of x, y and z ?
- (i). The average weight of A, B and C is 45 kg. If the average weight of A and B be 40 kg and that of B and C is 43 kg, find the weight of B.

(ii). The average age of a class of 39 students is 15 years. If the age of the teacher be included, then the average increases by 3 months. Find the age of the teacher.
- Verify whether the following formula is tautology or not:
 $(\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R)$
- Find the disjunctive and conjunctive normal form for the following:
 $\neg(P \vee Q) \Leftrightarrow (P \wedge Q)$
- (i). A survey in 2000 peoples asked households whether they had a Computer, a DVD player or LCD TV. 40 had a computer, 60 had a DVD player and 50 had LCD TV. 25 owned computer and DVD player, 30 owned a DVD player and had LCD TV, 35 owned a computer and had LCD TV. 10 households had all three. How many households had at least one of the three?

(ii). If $A = \{1,2,3,4\}$, $B = \{2,4,6,8\}$ and $C = \{3,4,5,6\}$, then find (a) $(A \cup B) \cup C$ (b) $(A \cap B) \cap C$
- (i). Two concentric circles form a ring. The inner and outer circumferences of the ring are $50\frac{2}{7}m$ and $75\frac{3}{7}m$ respectively. Find the width of the ring.

(ii). If the edge of a cube is increased by 50%, find the percentage increase in its surface area.
