



Institute of Management
JK Lakshmipat University
Jaipur

END TERM EXAMINATION 2017

Programme: B. Com (H) Sem- I
MM: 50 Marks

Sub: Business Mathematics
Time: 3 Hours
Subject code: QT05

Instructions: Attempt any three questions from Section A. Section B is compulsory.
Use of non-programmable scientific calculator is permitted.

Section A

- Q1. (a) If $x^{\sqrt{x}} = (\sqrt{x})^x$, show that $x=4$.
(b) Simplify

$$\sqrt[lm]{\frac{x^l}{x^m}} \times \sqrt[mn]{\frac{x^m}{x^n}} \times \sqrt[nl]{\frac{x^n}{x^l}}$$

- (c) If $2^x = 3^y = 6^z$, show that $Z = \frac{xy}{x+y}$

(3+3+4)

- Q2. (a) Explain Even and Odd Function with an example. Also, define One-to-one mapping and Many-to-one mapping with an example.

- (b) If $h(x) = x^2 + 3x + 6$ and $g(y) = \frac{y}{1+y}$ then find $g[h(2)]$

(5+5)

- Q3. (a) Find the domain of the function $f(x) = \frac{4x-5}{\sqrt{x^2-7x+12}}$

- (b) In an engineering college, 80 students get chance for computer science, 75 for information technology, and 72 for electronics. If 60 students get change in 1st and 2nd, 50 in 2nd and 3rd, 40 in 1st and 3rd and 30 get chance in all 3 branches, how many seats are then in the engineering college?

(c) In a group of 50 people, 35 speak Hindi, 25 speak both English and Hindi and all the people speak at least one of the two languages. How many people speak only English and not Hindi? How many people speak English?

(2+4+4)

Q4. An amount of Rs. 5000 is put into three investments at the rates of interest of 6%, 7%, and 8% per annum respectively. The total annual income is Rs. 358. If the combined income from the first two investments is Rs. 70 more than the income from the third, find the amount of each investment? (10)

Q5. (a) A and B started a business with an agreement that they would share profit and loss in the ratio 3:4. After some days they allowed C to join their business with capital of Rs. 5000 on condition that he would get $\frac{1}{4}$ th part of total profit. Find the share of profit of A and B. If the profit at the end of the year become Rs. 8,400. Find the amount received by each of A, B and C. (6)

(b) Show that the matrix $X = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ satisfies the equation $X^2 - 4X = 5I$, where I is the identity matrix of order 3. (4)

Section B

Q6. (a) An industrialist is manufacturing two types of product A and B. M_1 and M_2 are two machines which are used for manufacturing the two types of products. The time (in hours) taken by A and B on the machines is given below

	Machines	
	M_1	M_2
Product A	20	10
Product B	10	20

If 600 hours is the time available on each machine, calculate the number of units manufactured of each type (Solve this problem by using Cramer's rule).

(b) Consider an economy consisting of three sectors: agriculture, manufacturing and services. The hypothetical flow of goods and services in physical units is summarized in the following table:

	Agriculture	Manufacturing	Services	Final Demand
Agriculture	60	180	0	120
Manufacturing	30	60	30	180
Services	0	40	10	100

If the demand changes to [150 160 180], what should be the new output?

(c) Determine the rank of the matrix

$$A = \begin{bmatrix} 4 & -1 & 2 \\ 3 & 4 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

(6+10+4)