

FOUNDATION EXAMINATION - DECEMBER 2009

(26) Business Mathematics and Statistics

03-01-2010
Morning
[9.00 – 12.00]

Time: 3 hours

• **Instructions to candidates:**

- (1) This paper consists of three (03) parts **A, B & C.**
- (2) **Five (05) questions should be answered as follows:**
 - **Question No.01 of Part A**
 - **Both questions of Part B**
 - **Any two (02) questions from Part C**
- (3) Submit all workings and calculations. State clearly assumptions made by you, if any.
- (4) Use of calculators is permitted.
- (5) Answers should be in one language in the medium applied for, in the booklets provided.
- (6) Graph paper will be provided.
- (7) 100 marks.

No. of Pages: 06
No. of Questions: 06

PART - A

Multiple Choice Questions
Answer all parts of question No.01
30 marks

01. Select from (1), (2), (3), (4) the **most correct** answer to each of the following parts.
Write the number of the selected answer in your answer booklet with the English letter.

(A) The biggest prime factor common to numbers 3,570 and 2,660 is:

- (1) 17 (2) 7 (3) 19 (4) 10

(B) Factors of $x^3 - 27$ are:

- (1) $(x+3)(x-3)$ (2) $(x+3)(x^2+3x+9)$
(3) $(x-3)(x^2-3x+9)$ (4) $(x-3)(x^2+3x+9)$

(C) The equation of the straight line which cuts x axis at 5 and passes through the point (3,4) is:

- (1) $y = 2x + 10$ (2) $y + 2x = 10$ (3) $y = 2x - 10$ (4) $y = -2x - 10$

(D) Evaluate $\log_2(32)$:

- (1) 5 (2) 16 (3) 2 (4) 5.65

(E) The investment that has to be made now, to get Rs.10,000/- in 3 years at 8% per annum interest rate compounded annually is:

- (1) Rs.8,573.38 (2) Rs.7,938.32 (3) Rs.8,046.51 (4) Rs.7,600.00

(F) The 2nd term of an arithmetical progression exceeds the 5th term by 18. The common difference (d) of the progression is:

- (1) 9 (2) -9 (3) 6 (4) -6

(G) A company has to select a five member team out of eight officers to take part in a foreign conference. The number of different ways the team could be selected is:

- (1) 102 (2) 56 (3) 208 (4) 14

(H) Assume that the supply function is represented by $P = 0.05q + 10$, and the demand function is represented by $P = 17 - 0.02q$ where P is the price and q is the quantity. Then the equilibrium price is:

- (1) Rs.5.00 (2) Rs.10.00 (3) Rs.25.00 (4) Rs.15.00

(I) Which one of the following can be considered as a method used for the collection of primary data?

- (1) Questionnaires. (2) Company's financial statements.
(3) Bank reports. (4) Government statistics.

(J) When a sample is selected from a population, if each item in the population has an equal chance of getting into the sample, it is known as:

- (1) Simple random sampling. (2) Convenience sampling.
(3) Quota sampling. (4) Stratified random sampling.

(K) A pot contains six(06) red marbles and four(04) black marbles all of equal size. Two marbles are drawn without replacement from the pot. What is the probability that both marbles are black?

- (1) $\frac{2}{15}$ (2) $\frac{3}{15}$ (3) $\frac{3}{9}$ (4) $\frac{4}{10}$

(L) Find the Harmonic Mean of the numbers 20 and 60:

- (1) 40 (2) 45 (3) 30 (4) 34.6

(M) Calculation of Paasche's price index does **not** consider:

- (1) Current year prices. (2) Base year prices.
(3) Current year quantities. (4) Base year quantities.

(N) The standard deviation of the set of numbers 6, 6, 6, 6, 6, is:

- (1) 1 (2) 6 (3) 0 (4) 5

(O) 5, 15, 10, 15, 5, 10, 10, 15, 30, 15

The mean, median and mode of the above data are:

- (1) 12.5, 13, 10 (2) 13, 12, 15
(3) 13, 15, 15 (4) 13, 12.5, 15

(02 marks each, Total 30 marks)

PART - B

Compulsory Questions

Answer both questions of this Part
50 marks

02. (a) The income from a mine increases every year by 12% of the income it received in the previous year. If the income received in the first year is Rs.60 million, find the total income received from the mine for the first eight(08) years. (05 marks)
- (b) A person deposits Rs.1,000/- at the beginning of each year for four(04) years at 10% interest per annum. Find the balance in the deposit account at the end of the 4th year. (05 marks)
- (c) A manufacturer knows that if x products are demanded (in units of 100) in a particular week, then the total cost function is $14 + 3x$ and the total revenue function is $19x - 2x^2$ (in units of 1,000).
Find the break-even point. (05 marks)
- (d) If an adult and a child take four(04) days to complete a job and the adult alone can complete the job in six(06) days, find how long would it take for the child to complete that work. (05 marks)
- (e) Two(02) projects are expected to generate the following cash inflows during the next four(04) year period. Initial cost of each project is Rs.215,000/-.
Assuming that these cash inflows occur at the end of each year, calculate the Net Present Value of each project. The cost of capital of these projects is 20% per annum.

Period (Year)	Project A (Rs.)	Project B (Rs.)
1	200,000	150,000
2	50,000	150,000
3	50,000	50,000
4	100,000	50,000

You may use the following discount factors:

Year	1	2	3	4
Discounting Factor @ 20%	0.8333	0.6944	0.5787	0.4823

(05 marks)
(Total 25 marks)

03. (a) Consider the exam marks of some students shown below:

Group	No. of students
10 - 19	2
20 - 29	3
30 - 39	4
40 - 49	5
50 - 59	4
60 - 69	3
70 - 79	2

Construct a histogram based on the above data and estimate the median value from the histogram. (05 marks)

- (b) Following table shows the ranking of 10 students according to the marks obtained for English Language and Mathematics in an examination held recently.

Students	A	B	C	D	E	F	G	H	I	J
English Language (Rank)	1	2	4	6	3	5	9	7	10	8
Mathematics (Rank)	4	5	3	1	9	7	6	8	2	10

Find the rank correlation coefficient of the above data and comment on your answer. (05 marks)

- (c) The following table shows the details of the purchase of three(03) kinds of fruit from the **ABC Super Market** for the year 2004 and 2006, where the quantities are in units and prices are in rupees.

Fruit	Year 2004		Year 2006	
	Unit Price Rs.	Quantity	Unit Price Rs.	Quantity
	p_o	q_o	p_n	q_n
Apple	2.50	25	3.00	30
Orange	4.50	10	6.00	8
Banana	0.60	10	0.84	15

Assuming 2004 as the base year calculate Laspeyre's Price Index for the year 2006. (05 marks)

- (d) 100 students sat for a particular examination of which 60 were boys. Number of students who passed this examination was 40 of whom 20 were girls.

Find the probability of,

- A student passing that examination.
- A girl passing that examination.
- A selected student who is a boy, failing the examination. (05 marks)

- (e) Find the standard deviation of the following frequency distribution:

Class Interval	Frequency
56 - 58	5
59 - 61	15
62 - 64	25
65 - 67	35
68 - 70	10

(05 marks)
(Total 25 marks)

PART - C

Answer **only two (02) questions** from this Part
20 marks

- 04.** (a) Every 15 minutes a pump exhausts one quarter of the water a tank contained in it at the beginning of the 15 minutes. If the tank initially holds 256,000 litres, how much water will remain in the tank after 1 hour? (05 marks)

- (b) Compute the mean deviation of the following set of numbers:

6, 3, 8, 1, 10, 14

(05 marks)
(Total 10 marks)

- 05.** (a) An amount of Rs.3,750/- is deposited in a bank paying an annual interest rate of 4% compounded monthly. Find the balance after 3 years and 2 months. (05 marks)

- (b) In how many ways can a group of 4 boys be selected from 10 if,

(i) The eldest boy is included in each group?

(ii) The eldest boy is excluded in each group?

(05 marks)
(Total 10 marks)

- 06.** (a) In how many ways can a supermarket manager display five(05) brands of cereals in three(03) spaces in a row on a shelf? (05 marks)

- (b) Using the data in the table below, construct a cumulative frequency table and draw a cumulative frequency curve (less than).

Age (years)	Frequency
21 - 30	5
31 - 40	8
41 - 50	15
51 - 60	11
61 - 70	5
71 - 80	1

(05 marks)
(Total 10 marks)