# FYBCOM/SEM-II/EXT/MATHS-II

**Time: 3 hrs** **Marks:100**

**Note:**
1. **All questions are compulsory with internal options.**
2. **Figures to the right indicate full marks.**
3. **Graph paper will be provided on request.**
4. **Use of simple six function calculator is allowed.**

**Q.1 Attempt the following (Any Four)** **(20)**

(a) Differentiate the following function with respect to x.

(i) $y = x^4 + e^x + 5^x - logx + 7$

(ii) $y = \frac{4x^2+3}{logx-5}$

(b) Find second order derivative of the following functions

$f(x) = x^3 - 5x^2 + 24x + 10$

(c) The demand function is given by $p = 40 + 12D - 3D^2$ where p=price and D=demand. Find the total revenue and marginal revenue function when the demand is 5 units.

(d) The total cost of producing $x$ units is given by $C = x^2 + 10x + 25$. Find the total cost, average cost and marginal cost function if 10 items are manufactured.

(e) The demand function of commodity is given by $D = 44 - 4p - p^2$. Where D is demand and p is price. Find the elasticity of demand with respect to price when price is 2.

**Q.2 Attempt the following (Any Four)** **(20)**

(a) Mr. Sinha borrows ₹12,000 for 4 years at compound interest rate of 6% p.a. How much have to repay at the end of each period.

(b) For an immediate annuity to be repaid for 4 years with interest compounded at 9% p.a. the present value is ₹10,000. Find the annuity payment of each year.

(c) A loan of ₹80,000 is to be returned in 3 monthly instalments at the rate of 12% per annum compounded monthly. Find the EMI using reducing balance method.

(d) A sum of ₹6,400 accumulated to ₹9280 in a certain period. If the rate of simple interest is 9%, find the period.

(e) Find the present value of an annuity of ₹50000 per year for 4 years at 8% compound interest per annum.

**Q.3 Attempt the following (Any Four)** **(20)**

(a) Calculate the product moment coefficient of correlation using the following data.

$n=12, \sum x=35, \sum y=60, \sum x^2 = 148, \sum y^2 = 450$ and $\sum xy=105$.

(b) Find the Spearman's rank correlation coefficient from the following data.

| X | 70 | 65 | 71 | 62 | 58 | 69 | 78 | 64 |
|---|---|---|---|---|---|---|---|---|
| Y | 91 | 76 | 65 | 83 | 90 | 64 | 55 | 48 |

(c) Explain the method of scatter diagram for deciding the type of Correlation

(d) From the following data, obtain the yield when the rainfall is 30 inches. The correlation coefficient between rain and yield is 0.8.

| | Rainfall (inches) | Yield (per acre) |
|---|---|---|
| Mean | 27 | 40 |
| S.D. | 3 | 6 |

(c) It is known that the two regression equations are 2x-3y-66=0 and 2x+y-38=0. Find the mean values of x and y. Also find the correlation between x and y.

**Q.4 Attempt the following (Any Four)** **(20)**

(a) Explain the different components of time series.

(b) Find three yearly moving averages for the following data. Plot the given data as well as the moving averages on the graph paper.

| Year | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|
| Time series | 87 | 90 | 92 | 98 | 105 | 93 | 100 | 110 | 125 |

(c) Fit a straight-line trend from the following data.

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Production | 75 | 82 | 85 | 90 | 98 | 102 | 120 |

(d) Find Laspeyre's, Paasche's and Fisher's numbers from the following data.

| Commodity | Base Year | | Current Year | |
|---|---|---|---|---|
| | Price | Quantity | Price | Quantity |
| A | 3 | 9 | 5 | 8 |
| B | 6 | 11 | 7 | 5 |
| C | 5 | 15 | 6 | 11 |

(e) Calculate the Cost of living index number using Family Budget Method

| Group | Price in 2000 | Price in2014 | Weight |
|---|---|---|---|
| Food | 32 | 40 | 20 |
| Rent | 25 | 30 | 10 |
| Clothing | 40 | 55 | 5 |
| Fuel | 3 | 4 | 7 |
| Miscellaneous | 8 | 14 | 8 |

**Q.5 Attempt the following (Any Four)** **(20)**

(a) State any five properties of Normal Distribution.

(b) For a normal distribution, the lower quartile $Q_1$ is 70 and the standard deviation is 5. Find (i) mean deviation (ii) median (iii) quartile deviation.

(c) A random variable X follows Poisson distribution with mean 2. Find the probability (i) 0 success (ii) at most 2 success (Given: $e^{-2}= 0.135$)

(d) The probability that a student is a swimmer is 4 out of 5. 5 students are selected at random. Find the probability that (i)4 are swimmers (ii)1 or less swimmers

(e) The weekly wages of 8000 workers are normally distributed with mean ₹770 and S.D. ₹70 .Find the number of workers whose wages below ₹700(Area between z=0 and z=1 is 0.3413)

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