



<https://shikshamentor.com/applied-maths-sem-ii-diploma-msbte-k-scheme-syllabus/>  
312301 – Applied Mathematics (Sem II)  
As per MSBTE's K Scheme  
Model Question Paper

3 Hours/70 Marks

- Instructions:
- (1) All questions are compulsory
  - (2) Figures to the right indicate full marks
  - (3) Mobile phone and any other Electronic Communication devices are not permissible.

**Q.1 Attempt any FIVE of the following:**

**Marks: 10**

a) Evaluate:  $\int \sin^2 x \, dx$

b) Evaluate:  $\int \log x \, dx$

c) Evaluate:  $\int_2^4 \frac{1}{2x+3} \, dx$

d) Find the order and degree of  $\frac{d^2y}{dx^2} = \sqrt{1 + \frac{dy}{dx}}$

e) Find the approximate value of  $\sqrt{67}$  by using Bakhshali Iterative method.

f) Show that there exist a root of the equation  $x^3 + 2x^2 - 8 = 0$  between 1 and 2

g) An unbiased coin is tossed 5 times. Find the probability of getting a head.

**Q.2 Attempt any THREE of the following:**

**Marks: 12**

a) Evaluate:  $\int \frac{1}{(\sin^{-1} x)^2 \sqrt{1-x^2}} \, dx$

b) Evaluate:  $\int \frac{\sec^2 x}{(1+\tan x)(2+\tan x)} \, dx$

c) Evaluate:  $\int \tan^{-1} x \, dx$

d) Evaluate:  $\int \frac{dx}{2x^2+3x+1}$

**Q.3 Attempt any THREE of the following:**

**Marks: 12**

a) Evaluate:  $\int \frac{dx}{4\cos^2 x + 9\sin^2 x}$

b) Evaluate:  $\int_0^{\pi/2} \frac{1}{1+\cot x} \, dx$

c) Solve the d.e.  $x(1 + y^2) dx + y(1 + x^2) dy = 0$ .

d) Using Bisection method find the approximate root of the equation  $x^3 - 6x + 3 = 0$

(Perform two iterations)

**Q.4 Attempt any THREE of the following:**

**Marks: 12**

a) Use Newton Raphson method to evaluate  $\sqrt[3]{20}$ .

(upto three iterations only)

b) Using Regula-Falsi method, find approximate root of  $x^3 - 9x + 1 = 0$ .

(Three iterations only)

c) Solve the equation by Jacobi's method. (Three iterations only)

$$10x + y + 2z = 13; 3x + 10y + z = 14; 2x + 3y + 10z = 15$$

d) The probability that a man aged 65 will live to 75 is 0.65. What is the probability that out of 10 men which are now 65, 7 will live to 75.

e) If 2% of the electric bulbs manufactured by company are defective, find the probability that in a sample of 100 bulbs,

i) 3 bulbs are defective,

ii) At the most two bulbs will be defective.

( $e^{-2} = 0.1353$ )

**Q.5 Attempt any TWO of the following:**

**Marks: 12**

a) i) Evaluate:  $\int \frac{dx}{5+4\cos x}$  CO1

ii) Evaluate:  $\int x \tan^{-1} x dx$

b) i) Evaluate:  $\int_0^1 \frac{dx}{x^2+x+1}$  CO2

ii) Evaluate:  $\int_0^\pi \cos^3 x \sin x dx$

c) Evaluate:  $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$  CO2

ii) Evaluate:  $\int_2^5 \frac{\sqrt{x}}{\sqrt{7-x} + \sqrt{x}} dx$

**Q.6 Attempt any TWO of the following:**

**Marks: 12**

a) i) Solve D.E.  $(2xy + y^2)dx + (x^2 + 2xy + \sin y)dy = 0$

ii) Form a D.E if  $y = A \cos x + B \sin x$ .

b) i) Solve the d.e.  $x \frac{dy}{dx} + y = x^3$  CO3

ii) Solve:  $e^{x+y} dx + e^{2y-x} = 0$ .

c) In a sample of 1000 cases the mean of certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find

i) How many students score above 18?

ii) How many students score between 12 and 15?

[Given :  $A(0.4) = 0.1554$ ,  $A(0.8) = 0.2881$ ,  $A(1.6) = 0.4452$ ]