ETT

E-001

Roll No. .....

APPLIED MATHEMATICS

2K5-BS-01

Time : 3 hrs. M.M. 100

Note :— 1. **Part 'A' may be attempted in first 5 pages of Answer Sheet.**
भाग 'क' के सभी उत्तर, उत्तर-पुस्तिका के प्रथम पांच पृष्ठों में ही करना हैं।

2. **Part 'B' in rest of the Sheets of Answer Sheet.**
भाग 'ख' के उत्तर, उत्तर-पुस्तिका के अगले शेष पृष्ठों में लिखिये।

3. ***Answers may be given in English or Hindi.***
प्रश्नों के उत्तर अंग्रेजी अथवा हिन्दी में दीजिये।

PART - 'A'

Attempt any TEN of the following questions :- **(10X2 = 20)**

(1) Write the set $\{x : x \text{ is a positive integer and } x^2 < 50\}$ in roster form.

(2) If $f(x)$ is an odd function defined in the interval $[-\pi, \pi]$, write the value of the fourier coefficient a_n.

(3) If A= {2,3,4} write the power set P(A) and find n[P(A)].

(4) If A= {2,3,4} and B = {3,4,5}, Find A ∩ B

(5) Evaluate $\int \frac{\log x}{x}\, dx$

(6) Evaluate $\int_1^3 (x+2x^2)dx$

(7) Evaluate $\int \sin^2 x\, dx$

(8) Evaluate $\int x\cos x\, dx$

(9) Obtain a_0 in the Fourier expansion of $f(x) = |\cos x|$, if $x \in [-\pi, \pi]$.

(10) Check whether $f(x) = 10x\cos x$ is an even or odd function.

(11) Find $L\{\sinh 2t\}$

(12) Find $L\{ t^2 e^{3t} \}$

(13) Find $L^{-1}\{ \frac{1}{S^2-9} \}$

(14) Find $L^{-1}\{ \frac{10}{S+9} \}$

Q. 2. Attempt any FIVE of the following questions : **(5X4 = 20)**

1) Let $A = \{11,12,13,14,15,16\}$, $B = \{12,14,16,18\}$, Find $A - B$ and $B-A$.

2) If $f(x) = x$ defined in $[-\Pi, \Pi]$, expand $f(x)$ as a Fourier series.

3) Evaluate $L\{ t\cos t \}$.

4) Prove that the total number of subjects of a set of n elements is 2^n.

5) Obtain a_0 in the Fourier expansion of $f(x) = e^{ax}, x \in [-\pi, \pi]$.

6) Evaluate $\int_0^a x^2\sqrt{a^2-x^2}\,dx$

7) Find $L^{-1}\{\frac{1}{S^2+7S+12}\}$

8) Evaluate $L\{ 2e^{3t}\cos 2t \}$

PART - 'B'

Attempt any THREE questions of the following : **(3x20=60)**

Q. 3. (a) Draw appropriate Venn diagram for each of the following:

(i) $A' \cap B'$, (ii) $(A \cap B)'$, (iii) $A \cup B'$, (iv) $A' \cap B$

(b) Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos\theta\, d\theta}{(1+\sin\theta)(2+\sin\theta)}$

Q. 4. (a) Evaluate $\int 2xe^{x^2}\cos^{x^2} dx$

(b) Evaluate $\int e^x \left(\frac{1+Sinx}{1+cosx}\right)^0 dx$

Q. 5. (a) Apply Simpson's one third rule to obtain an approximate value of the integral $\int_0^1 \frac{1}{1+x} dx$ by taking 10 equal intervals.

(b) Find the half-range cosine series for the function $f(x) = \begin{cases} 0, 0 \le x \le \frac{\pi}{2} \\ \frac{\pi}{2}, \frac{\pi}{2} < x \le \pi \end{cases}$

Q. 6. (a) Evaluate $L\{te^{-t} \sin 3t\}$

(b) Evaluate $L^{-1}\left\{\frac{S^2}{S^4 - a^4}\right\}$

Q. 7. (a) Obtain the Fourier series to represent the function $f(x) = |x|, -\pi < x < \pi$

(b) Obtain Fourier series to represent the function $f(x) = \begin{cases} 0, & 0 < x < \pi \\ k, & \pi < x < 2\pi \end{cases}$