

shilpa-2nd half-(c)13-7
Con. 6584-13.

LJ-10445

(3 Hours)

[Total Marks : 100

- N. B. : (1) Question No. 1 is compulsory.
(2) Attempt any **four** from the remaining **six** questions.
(3) Statistical table is **permitted**.

1. (a) Evaluate $\int f(z) dz$ along the parabola $y = 2x^2$ from $z = 0$ to $z = 3 + 18i$ 5

where $f(z) = x^2 - 2iy$.

(b) If the mean of the following distribution is 16. Find m , n and variance. 5

X	:	8	12	16	20	24
P (X = x)	:	1/8	m	n	1/4	1/12

(c) Evaluate $\int_c \vec{F} \cdot d\vec{r}$ where $\vec{F} = 2x i + (xz - y) j + 2z k$ from $0 (0, 0, 0)$ to $p (3, 1, 2)$ 5

along the line OP.

(d) A random sample of 50 items gives the mean 6.2 and standard deviation 10.24. 5
Can it be regarded as drawn from a normal population with mean 5.4 at 5% level of significance ?

2. (a) Evaluate $\int_c \frac{\sin^6 z}{(z - \pi/6)^n} dz$. Where 'c' is the circle $|z| = 1$ for $n = 1, n = 3$. 6

(b) Ten individuals are chosen at random from a population and their heights are 6
found to be 63, 63, 64, 65, 66, 69, 69, 70, 70, 71 inches. Discuss the suggestion that the mean height of the universe is 65 inches.

(c) Table shows the respective heights x and y of a sample of 12 fathers and their 8
oldest sons. Calculate rank correlation coefficient.

Height of father (inches) x	65	63	67	64	68	62	70	66	68	67	69	71
Height of son (inches) y	68	66	68	65	69	66	68	65	71	67	68	70

3. (a) Evaluate by Green's theorem $\int_c (2x^2 - y^2) dx + (x^2 + y^2) dy$, where 'c' is the 6

boundary of the surface in the xy -plane enclosed by the x -axis and the semicircle $y = \sqrt{1 + x^2}$.

[TURN OVER

(b) For a normal distribution 30% items are below 45 and 8% items are above 64. Find the mean and variance of the normal distribution. 6

(c) Obtain Taylor's and Laurent's expansions of $f(z) = \frac{z-1}{z^2-2z-3}$ indicating regions of convergence. 8

4. (a) A car-hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a poisson distribution with mean 1.5. Calculate the proportion of days on which neither car is used and the proportion of days on which some demand is refused. ($e^{-1.5} = 0.2231$). 6

(b) Evaluate $\oint_c \frac{e^z}{\cos \pi z} dz$, where 'c' is the circle $|z| = 1$. 6

(c) Find the line of regression for the following data and estimate y corresponding to $x = 15.5$. 8

X	:	10	12	13	16	17	20	25
Y	:	19	22	24	27	29	33	37

5. (a) A die was thrown 132 times and the following frequencies were observed. 6

No. Obtained	:	1	2	3	4	5	6	Total
Frequency	:	15	20	25	15	29	28	132

Test the hypothesis that the die is unbiased.

(b) The equations of the two lines of regression are $x = 19.13 - 0.87 y$ and $y = 11.64 - 0.50 x$. 6

Find :-

(i) the means of x & y.

(ii) the coefficient of correlation between x & y.

(c) Verify Stokes theorem for $\vec{F} = (2x - y) \mathbf{i} - y z^2 \mathbf{j} - y^2 z \mathbf{k}$ and 's' is the surface of hemisphere $x^2 + y^2 + z^2 = a^2$ lying above the xy-plane. 8

6. (a) Fit a Binomial distribution to the following data :- 6

x	:	0	1	2	3	4	5	6
F	:	5	18	28	12	7	6	4

(b) Write short notes on :- 6

(i) Null hypothesis and alternative hypothesis

(ii) Type I error and Type II error

(iii) Level of significance and confidence interval.

- (c) Calculate the correlation coefficient between x and y from the following data :- 8
 $N = 10$, $\Sigma x = 140$, $\Sigma y = 150$, $\Sigma (x - 10)^2 = 180$, $\Sigma (y - 15)^2 = 215$,
 $\Sigma (x - 10)(y - 15) = 60$.
7. (a) If X denotes the out come when a fair die is tossed, find moment generating function (M.G.F.) of X , and hence find the mean and variance of X . 6
- (b) Evaluate $\int_{-\infty}^{\infty} \frac{x^2 + x + 3}{x^4 + 5x^2 + 4} dx$, using contour integration. 6
- (c) Using Gauss's divergence theorem, evaluate $\iiint_s (ax^2 + by^2 + cz^2) ds$ over the 8
sphere $x^2 + y^2 + z^2 = 1$.



(3 Hours)



LJ-10553
| Total Marks : 100

- Note:
- 1) Question number one is compulsory.
 - 2) Attempt any four from remaining six questions.
 - 3) Figures to the right indicate full marks.

1. (A) Draw a neat sketch of a composite curve and show all elements there on. Also give their relationship 10
 (B) Describe various applications of the Total Station 05
 (C) Differentiate between fixed and moveable hair method of tacheometry. 05
2. (A) Two straights of a road intersect at chainage 2570 meters having their angle of intersection equal to 120° . Calculate the chainage of the point of tangent curve, point of curve tangent and midpoint of curve if the radius of curve is 250 10
 (B) A tacheometer was set up at an intermediate station 'C' of the line AB. Following readings were obtained.

Staff station	Vertical angle	Staff Readings		
A	$-6^\circ 20'$	0.445	1.675	2.905
B	$+4^\circ 20'$	0.950	1.880	2.810

The instrument was fitted with an anallatic lens. Find the gradient of the line joining station A and B. 10

3. (A) Explain the procedure for setting out a R. C. C building having outer dimensions as 50 meters \times 20 meters in a plot of 65 meters \times 35 meters. Enlist the surveying instruments to be used for this purpose 10
 (B) Explain working and principle of EDM. 10

- 4 (A) The WCB of two straights AB and BC of a railway line are 85° and 120° respectively. The chainage of point of intersection is 1505.5 m. These two straights are to be connected by circular curve of 300 m radius, calculate the necessary data for setting out the curve by Rankine's method. Take peg interval as 20 m. 10
- (B) The horizontal angle subtended on the theodolite station by a subtense bar with vanes 3 meter apart is $12^\circ 30'$. Compute the horizontal distance between the theodolite and bar. Calculate the error in the same if angular error is $+1'$. Also comments on the accuracy obtained by different methods of tachometry. 10
5. (A) How would you determine the constant of a tachometer? 06
- (B) With sketch explain slope rail. 04
- (C) What is precise leveling? Enlist the equipments used in precise leveling and explain the field procedure for conducting the precise leveling. 10
6. (A) A downgrade of -1 % is followed by an up gradient of 2 %. RL of intersection is 350 m and the chainage is 470 m. A vertical parabolic curve 120 m long is to be introduced to connect the down grade. The peg interval is 15 m. calculate the elevations of the curve by tangent correction. If the RL of line of collimation is 352.20 m then determine the RL of top of wooden pegs driven along vertical curve. 10
- (B) Explain how surface alignment and levels from surface one transferred to underground in tunnel surveys. 10
- Q.7 (A) Explain the "offsets from chord produced method" of setting out the simple circular curve. 10
- (B) Write the use of contour maps in civil engineering. 05
- (C) Explain methods of interpolating contour lines. 05