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Question Paper Code: ACE002



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER

B.Tech III Semester End Examinations (Regular), November – 2018

Regulation: IARE-R16

SURVEYING

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

1. a) A line was measured with a steel tape which is exactly 30 m long at 18 C and found to be 452.343 m. The temperature during measurement was 32 C. Find the true length of the line. Take coefficient of thermal expansion of tape $C = 0.0000117$ [7M]
- b) The following bearings were observed as shown in Table1 in running a closed traverse ABCDEA. Determine the corrected magnetic bearing of the line [7M]

Line	Fore Bearing	Back Bearing
AB	$71^{\circ} 05'$	250°
BC	110°	20°
CD	161°	35°
DE	220°	50°
EA	300°	50°

Table 1

2. a) A steel tape 20 m long standardized at 55°F with a pull of 10 Kg was used for measuring a base line. Find the correction per tape length, if the temperature at the time of measurement was 80°F and the pull exerted was 16 Kg. Take weight of tape as 0.8 Kg and $E = 2.109 \times 10^6 \text{ Kg/cm}^2$ coefficient of thermal expansion per $1^{\circ}\text{F} = 6.2 \times 10^{-6}$ and area of tape was 0.051 cm^2 . [7M]
- b) Find out the included angles in a closed traverse PQRSTP, the following observations were made with a compass as shown in Table2. Calculate the included angles after correcting for local attractions [7M]

Line	FB	BB
PQ	N $62^{\circ} 45'$ E 45	S $62^{\circ} 15'$ W
QR	N $21^{\circ} 00'$ E	S $20^{\circ} 45'$ W
RS	N $71^{\circ} 30'$ W	S $71^{\circ} 30'$ E
ST	S $39^{\circ} 00'$ W	N $38^{\circ} 00'$ E
TP	S $54^{\circ} 30'$ E	N $53^{\circ} 15'$ W

Table 2

UNIT – II

3. a) Define the term ‘contour’. State their applications in detail for plotting contour plans and characteristics along with a neat diagram. [7M]
- b) The following staff readings were observed successively with a dumpy level and a 4 m leveling staff. The instrument is shifted after third, sixth and eighth readings 2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 m. Enter the above readings in a page of a level book and calculate the reduced level of points if the first reduced level was taken with a staff held on a bench mark of 432.384 m. [7M]
4. a) The following ten successive readings were taken with a 4 m level staff held vertically the instrument being shifted after the fifth and eighth readings 1.315, 0.965, 1.345, 1.1.05, 0.875, 1.155, 1.305, 1.675, 1.345 and 1.875 m. The reduced level of the first turning point is 100.000 m. Find the reduced levels of the remaining points by the rise and fall method [7M]

- b) The pages of an old field book as shown below some readings were missing. Determine the missing data and apply necessary checks for the values shown in Table3 [7M]

Station	Back sight	Intermediate sight	Fore sight	Rise(m)	Fall(m)	Reduced level(m)	Remarks
1	2.228					432.387	
2		1.606		0.622			
3	2.090		0.988	0.618			
4		2.864			0.774		
5	0.602		1.262	1.602			
6	1.044		1.982				
7			2.684				

Table 3

UNIT – III

5. a) Compute an area enclosed between survey line, irregular boundary line, first and last offset by Simpson’s rule and sketch the profile for the observations as shown in Table4 [7M]

Distance(m)	0	20	40	60	80	120	160	220	280
Offset(m)	9.4	10.8	13.6	11.2	9.6	8.4	7.5	6.3	4.6

Table 4

- b) Evaluate an area of the closed traverse ABCDA from the following latitudes and departures as shown in Table5 using D.M.D (Double Meridian Distance) method [7M]

Line	Latitude	Departure
AB	+104	+6
BC	+20	+242
CD	-124	+6
DA	0	-254

Table 5

6. a) Calculate an area of the closed traverse ABCDA by total latitude and algebraic sum of adjoining departure method for the observations as shown in Table6 [7M]

Line	Latitude	Departure
AB	+108	+4
BC	+15	+249
CD	-123	+4
DA	0	-257

Table6

- b) A railway embankment is 10 m wide with side slope of 1.5 to 1. Assume the ground is level in direction traverse to the centre line, calculate the volume contained in a length of 120 m, the centre height at 20 m intervals being 1.8, 3.7, 4.8, 4.0, 2.8, 2.8, 3.5 m using Prismoidal rule. [7M]

UNIT – IV

7. a) Draw a neat sketch of vernier theodolite and describe the functions of various components along with their functions [7M]
- b) A closed traverse PQRSP as given below with the following length and bearings as shown in Table7 calculate closing error of a closed traverse [7M]

Line	Length in m	Bearing
PQ	340.2	$70^{\circ} 30'$
QR	350.6	$120^{\circ} 45'$
RS	440.8	$223^{\circ} 30'$
SP	423.2	$320^{\circ} 47'$

Table 7

8. a) Derive an equation for heights and distances using trigonometric leveling when bases are inaccessible and write their applications [7M]
- b) Explain briefly about sources of errors in a theodolite and illustrate the necessary precautions to eliminate these errors [7M]

UNIT – V

9. a) List out the advantages and disadvantages of a total station. Describe in detail about its components and functions [7M]
- b) Obtain angle of elevation and depression formulae for staff held in Inclined position using the stadia diaphragm of tacheometry [7M]
10. a) Write a brief note on global positioning system and describe the segments of global positioning system in detail [7M]
- b) Illustrate in detail about geographical information system and their practical applications in the field of civil engineering [7M]



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COURSE OBJECTIVES:

The course should enable the students to:

I	Evaluate the basic principles of surveying and its classification.
II	Identify, formulate and solve the problems in the field of advanced surveying.
III	Determine the contour points and their importance in surveying.
IV	Analyze survey data and design the civil engineering projects.

COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

CACE002.01	Analyze the sources of errors in linear measurements
CACE002.02	Evaluate the corrections for true length, true area and true volumes of calculated data.
CACE002.03	Determine the errors in chain and tape length
CACE002.04	Obtain directions of a surveying line with a prismatic compass.
CACE002.05	Determine the bearing angles by a prismatic compass.
CACE002.06	Draw a traverse and calculate area enclosed within the traverse.
CACE002.07	Measure the corrected bearing angles without local attraction.
CACE002.08	Differentiate the whole circle and quadrant bearing systems.
CACE002.09	Draw cross section and prepare contour maps for road works, rail works, canals etc.
CACE002.10	Predict Reduced Levels with reference to a common assumed datum.
CACE002.11	Sketch the profile the of land from the reduced levels.
CACE002.12	Differentiate the basic concepts in leveling such as datum and bench mark etc.
CACE002.13	Calculate the volume of earth work, the sectional areas of the cross- section.
CACE002.14	Compute an area of filed which is surrounded by irregular boundaries.
CACE002.15	Calculate an area by latitudes and departures of a closed traverse
CACE002.16	Explain the importance of theodolite and the principle of measuring angles in horizontal and vertical plains.
CACE002.17	Understand the components of theodolite and errors in elimination of parallex.
CACE002.18	Calculate the error of closure in a closed traverse
CACE002.19	Differentiate the advantages of global positioning system and geographical information.
CACE002.20	Analyze the basic principle of total station in recording the field data

CACE002.21	Derive an equation for calculation of heights and distances using principles of tacheometry survey
CACE002.22	Derive an equation for calculation of heights and distances using principles of triangulation survey
CACE002.23	Possess the knowledge and skills for employability and to succeed in national and international level competitive examinations

MAPPING OF MODEL QUESTION PAPER QUESTIONS TO THE ACHIEVEMENT OF COURSE LEARNING OUTCOMES:

SEE QUESTION No.		COURSE LEARNING OUTCOMES		BLOOM TAXONOMY LEVEL
1	a	CACE002.01	Analyze the sources of errors in linear measurements.	Understand
	b	CACE002.06	Sketch a closed traverse and calculate an area enclosed within the traverse	Understand
2	a	CACE002.03	Determine the errors in chain and tape length	Understand
	b	CACE002.08	Differentiate the whole circle and quadrant bearing systems .	Understand
3	a	CACE002.09	Draw cross section and prepare a contour maps for road works rail works, canals etc.	Remember
	b	CACE002.10	Predict Reduced Levels with reference to a common assumed datum.	Remember
4	a	CACE002.11	Sketch the profile of the land from the reduced levels.	Remember
	b	CACE002.10	Predict Reduced Levels with reference to a common assumed datum solutions	Remember
5	a	CACE002.14	Compute an area of filed which is surrounded by irregular boundaries graphs to model application problems	Understand
	b	CACE002.15	Calculate an area by latitudes and departures of a closed traverse solve an appropriate problem.	Understand
6	a	CACE002.15	Calculate an area by latitudes and departures of a closed traverse solve an appropriate problem.	Remember
	b	CACE002.14	Compute an area of filed which is surrounded by irregular boundaries.	Understand
7	a	CACE002.17	Understand the components of theodolite and errors in elimination of parallax if the greedy rule chosen leads to an optimal solution	Understand
	b	CACE002.18	Calculate the error of closure in a closed traverse.	Remember
8	a	CACE002.22	Derive an equation for calculation of heights and distances using principles of triangulation survey solutions.	Understand
	b	CACE002.16	Explain the importance of theodolite and the principle of measuring angles in horizontal and vertical plains.	Understand
9	a	CACE002.20	Analyze the basic principle of total station in recording the field data graphs to model application problems.	Remember
	b	CACE002.21	Derive an equation for calculation of heights and distances using principles of tacheometry survey	Understand
10	a	CACE002.21	Derive an equation for calculation of heights and distances using principles of tacheometry survey	Remember
	b	CACE002.19	Differentiate the advantages of global positioning system and geographical information.	Understand

Signature of Course Coordinator

