

[3hrs]

[80 marks]

- N. B.** (1) Question No. 1 is **compulsory**.
 (2) Solve any **three** questions from remaining questions.
 (3) Assume suitable data wherever required and state them clearly.
 (4) Use of IS 456 is not permitted.

1. (a) Justify the code provision for the limiting neutral axis depth for any section in LSM. 5
 (b) Explain how the neutral axis is located in T beam section at the ultimate limit state, given that it lies outside the flange. 5
 (c) The shear resistance of bent up bars cannot be counted upon, unless stirrups are also provided, Why? 5
 (d) Why does the Code specify limits to the minimum and maximum reinforcement in columns? 5
- 3 (a) A rectangular R.C. beam is 300 mm x 600 mm deep. It is reinforced with 6 bars of 20 mm diameter on tension side and 3 bars of 16 mm diameter on compression side at an effective cover of 50 mm for both the steels. Calculate ultimate moment of resistance of the section if grade of concrete is M20 and grade of steel is Fe 415. 10

d' / d	0.05	0.1	0.15	0.2
f_{sc} (N/mm ²)	355.1	351.9	342.4	329.2

- (b) A rectangular R.C beam is 300mm x 550 mm deep is subjected to an ultimate torsional moment of 40kNm, ultimate BM of 50kNm and ultimate shear force of 35kN. Adopt grade of concrete M 20 and grade of steel Fe 415. Assume effective cover to tension and compression reinforcement as 40mm. Design the beam. 10

p_t (%)	≤ 0.15	0.25	0.50	0.75	1.0	1.25	1.50	1.75	2.00
τ_c (N/mm ²)	0.28	0.36	0.48	0.56	0.62	0.67	0.72	0.75	0.79

- 2 (a) A singly reinforced rectangular beam with width 250 mm and effective depth 500 mm is reinforced with 5 bars of 20 mm diameter. Calculate the ultimate moment of resistance of the section using limit state method. Grade of concrete M 20 and steel Fe 415. 6
 (b) A reinforced concrete beam 300 mm x 600 mm overall depth reinforced with 5 bars of 20 mm diameter is used as a simply supported beam over an effective span of 6 m. Determine the maximum udl the beam can carry safely (including self weight). Adopt M 20 grade of concrete and Fe 500 steel. 10

Turn Over

- (c) What are the various factors that influence the effective flange width in a T beam? 4

4. (a) Design a slab on a hall of size 4 m x 6 m effective. The slab is simply supported on 230 mm wall on all four sides. Consider LL 3 kN/m² and floor finish 1 kN/m². Assume M 20 grade of concrete and Fe 415 steel. 12

Ly/Lx	1.1	1.2	1.3	1.4	1.5	1.75	2.0
α_x	0.074	0.084	0.093	0.099	0.104	0.113	0.118
α_y	0.061	0.059	0.055	0.051	0.046	0.037	0.029

Values of (k) for Solid Slabs

Overall Slab Depth (mm)	≥ 300	275	250	225	200	175	≤ 150
(k)	1.00	1.05	1.10	1.15	1.20	1.25	1.30

- b) Determine the ultimate moment of resistance of a T beam section using Fe 415 grade steel and M20 concrete grade. 8
 Width of flange = 1000mm
 Depth of slab = 100mm
 Width of rib = 300mm
 Area of steel = 6- 20 mm ϕ on tension side
- 5 (a) Draw Whitney's Stress block and hence determine the ultimate moment of resistance of a beam 300 mm wide and 600mm deep considering it as a balanced section. Take $\sigma_{cu} = 20$ N/mm² and $\sigma_{sy} = 425$ N/mm². 6
- (b) A R.C. beam 250 mm x 500 mm effective depth is subjected to an ultimate moment of resistance of 250 kN-m. Calculate the steel reinforcement required for the beam. Assume $\sigma_{cu} = 20$ N/mm² and $\sigma_{sy} = 425$ N/mm². Use Ultimate Load Method. 10
- (c) Explain the need for corner reinforcement in two way rectangular slabs whose corners are prevented from lifting up. 4
- 6 (a) A rectangular column of dimensions 300 mm x 650 mm is subjected to an ultimate axial load of 1500kN. Design an isolated footing for the column assuming safe bearing capacity of soil to be 250 kN/m². Adopt grade of concrete M 20 and grade of steel Fe 415. 12
- (b) Design a short square column subjected to a factored load of 3000kN. Adopt grade of concrete M 25 and steel Fe 415. 8

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149

B.E - sem - V - CBS 95 - Civil - QSEV

28/11/17

Q.P. Code: 25325

(4 Hours)

[Total marks : 80]

NOTE:

- Question No. 1 is compulsory.
- Attempt any three out of the remaining five questions.
- Figures to the right indicate full marks
- Assume suitable data if required.

- Q.1 Work out the following quantities from given plan & section. (Fig.01) 20
- RCC(M20) upto Plinth Level (Footings, columns and plinth beams)
 - Internal plaster in c:m 1:5, 15 mm th.
 - Brick work in c:m 1:6
 - Flooring and skirting
- Q.2 A) Work out the plinth area of building shown in fig 01. Prepare an approximate estimate of the same assuming cost of construction of super structure as Rs.8000 / sqm. 10
- B) What is pre bid meeting? Explain in brief from owner's and contractors' point of view. 05
- C) Draft a typical tender notice for construction of Hostel building in a city area. The work is estimated to cost Rs. 10 crores, to be completed in 18 months. 05
- Q.3 A) Explain how various factors affect rate of an item. Perform rate analysis for 15 mm thick Plastering work in cement mortar 1:4. 10
- B) Define specification. Draft the detailed specification for First class work in cement mortar 1:5. 10
- Q.4 A) Define and explain the purpose of BBS. Work out the quantity of materials (sand, cement, aggregate and steel) in PB5 of Fig 01. Top steel 2-12#, Bottom steel 2-12# Extra at Bottom of length 0.7L 2-16#, stirrups 8# @ 200 c/c. 10
- B) The owner of a building gets a net annual rent of Rs. 35000. The future life of the building is estimated 12 years. But if recommended repairs are carried out immediately at an estimated cost of Rs. 3,00,000, it is expected to last for at least 30 years. 10
- Assuming the rate of interest as 8%, and rate of interest on sinking fund 6%, determine whether it is economical to carry out the recommended repairs to the building or leave it as it is.
- Q.5 A) Prepare a detailed estimate for earthwork for a portion of a road from the following data.: 12
- Formation width of road is 10 m, side slopes 2:1 in banking and 1.5:1 in cutting. Take the rates of earthwork as Rs. 125 per cum in banking and Rs. 130 per cum in cutting

Dist in m	0	100	200	300	400	500	600	700	800	900	1000	1100	1200
GL	114.5	114.75	115.25	115.2	116.1	116.85	118.00	118.25	118.1	117.8	117.75	117.90	119.50
FL	115	Upward gradient 1 in 200						Downward gradient 1 in 400					

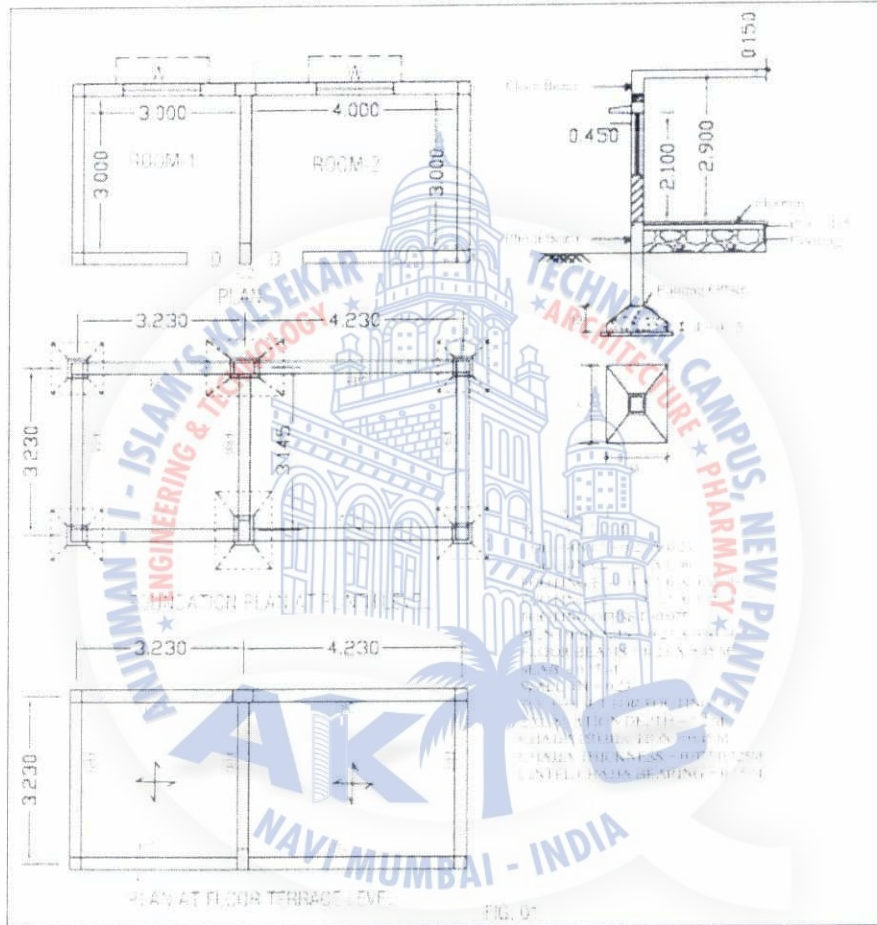
- B) List out types of contract and explain any one with its advantages and disadvantages and suitability. 8

Q.P. Code: 25325

Q.6 Write short notes on (any four)

20

- Mass haul diagram
- Rules for deduction in Plaster work
- EMD and SD
- Price variation clause
- Arbitration
- CBRI equations



Correction in Question Paper Code - 25325

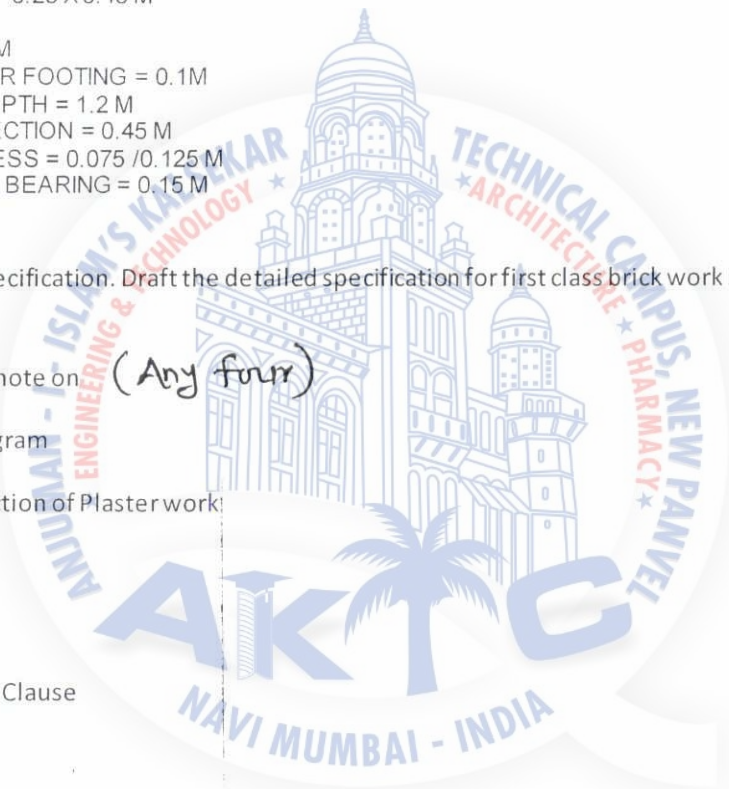
Correction in Fig. 1 - page No: 2

D= 1 X 2.1 M
W= 1.5 X1.2 M
COLUMN C1 = 0.23 X 0.23
COLUMN C2 = 0.23 X0.40
FOOTING F1 = 1.0 X 1.0 X0.35/0.15
FOOTING F2 = 1.1 X1.5X0.45 /0.15
FOOTING OFFSET = 0.075 M
PLINTH BEAMS = 0.23 X0.60 M
FLOOR BEAMS = 0.23 X 0.45 M
SLAB = 0.15 M
WALL TH. = 0.23M
PCC OFFSET FOR FOOTING = 0.1M
EXCAVATION DEPTH = 1.2 M
CHHAJJA PROJECTION = 0.45 M
CHAJJA THICKNESS = 0.075 /0.125 M
LINTEL / CHAJJA BEARING = 0.15 M

Q.3 B) Define Specification. Draft the detailed specification for first class brick work in cement mortar 1:5

Q. 6 Write Short note on (Any four)

1. Mass Haul Diagram
2. Rules for deduction of Plaster work
3. Arbitration
4. EMD and SD
5. Price Variation Clause
6. CBRI Equation



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Q. P. Code: 24754

(3 HOURS)

TOTAL MARKS:80

Note: [1] Q.No.1 is compulsory.

[2] Attempt any three questions out of remaining five questions

[3] Assume any data if required and mention clearly.

Q.No.1 Attempt any four:-

[a] Define irrigation. What is the necessity of irrigation? [5]

[b] Explain the terms: aquifer, aquiclude and aquifuge. [5]

[c] Describe various methods of computing average rainfall over a basin. [5]

[d] Explain the term 'storage coefficient' and 'coefficient of transmissibility'. [5]

[e] Explain Canal Lining. [5]

Q.No.2 [a] What are the factors affecting Run-off. What are various method of computing run-off? Explain any one method. [10]

[b] A canal takes off a reservoir to irrigate the areas given below. 40% of the water required for irrigation is assumed to be available directly from precipitation. Channel conveyance losses are 15%. Reservoir losses are 10%. What would be the capacity of reservoir needed? (The reservoir to be filled only once a year) [10]

Crop	Base period (days)	Duty at the field (ha/cumec)	Area under crop (ha)
Wheat	140	1700	400
Sugarcane	320	800	600
Rice	120	900	300
Cotton	220	1200	1200
Bajra	100	1200	600

Q.NO.3 [a] Explain various types of Rain-gauge with neat sketches. [10]

[b] Find the ordinates of a storm hydrograph from a 3hr storm with rainfall of 2, 6.75 and 3.75 cm during subsequent 3 hr intervals. The ordinates of hydrograph are given in the following table:

Hours	3	6	9	12	15	18	21	24	3	6	9	12	15	18	21	24
Ordinates of Unit hydrograph { cumec}	0	110	365	500	390	310	250	235	175	130	95	65	40	22	10	0

Assume an initial loss of 5 mm, infiltration index of 2.5 mm/hr and base flow of 10 cumecs. [10]

Q. P. Code: 24754

Q.No.4 [a] Derive an equation for discharge from a well in an unconfined aquifer. [10]

[b] Explain various types of reservoirs. What do you understand by multipurpose reservoir? [10]

Q.No.5 [a] A rectangular masonry dam is 3 mt at the base. Compute the maximum permissible height H (a) when no tension is permissible, and (b) when the factor of safety against sliding is 1.5. Given the following: (i) $\mu = 0.5$, (ii) density of masonry = 24 times the of water, and (iii) $c=1$. What will be corresponding values of H if uplift is neglected? [10]

[b] Discuss the causes of failure of earth dams. [10]

Q.No.6 Write short notes on following: [5x4]

- (a) Hydrologic Cycle and Types of Precipitation
- (b) Silt extractor and silt ejector
- (c) Cross Drainage Work
- (d) Reservoir Planning



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BE - sem-VII - Civil - CBSAS - EE-II

12/12/12

QP Code: 26310

(3 Hours)

[Total Marks: 80]

- N.B:** 1. Question No.1 is compulsory
 2. Attempt any **three** questions from remaining **five** questions.
 3. Assume any suitable data where ever required.
 4. Figures to the right indicate full marks.

- Q.1** Solve the following : 20
- What is conservancy system and water carriage system?
 - Compare, in a tabular form, low rate and high rate tricking filters.
 - What are drop manholes and lamp holes?
 - What is self-purification of stream?
- Q.2**
 - Design a septic tank for a hostel housing 125 persons. Also design the soil absorption system for the disposal of the septic tank effluent, assuming the percolation rate as 20 minutes per cm. 10
 - Explain with the help of diagram, various systems of plumbing used for house drainage. 10
- Q.3**
 - Explain the necessity and process mechanism of anaerobic digestion of sludge. How the solid, liquid and gaseous products of digestion are disposed off? 10
 - Design a conventional activated sludge plant to treat domestic sewage, given the following data: 10
 Population=40,000
 Average sewage flow=180 lpcd
 BOD of sewage=240mg/lit
 BOD removed in primary clarifier=25%
 Overall BOD reduction=80%
 Based on the information above, determine
 (a) Volume of aeration tank
 (b) Aeration period or H.R.T.
 (c) Sludge Retention Time
 (d) Tank dimensions
- Q.4**
 - During BOD test conducted on a 5% dilution of waste, the following observations were taken. 10
 i) DO of aerated water used for dilution=3.6mg/lit
 ii) DO of original sample=0.8mg/lit
 iii) DO of diluted sample after 5 day incubation=0.7mg/lit
 Compute
 a) 5day BOD b) Ultimate BOD
 - Explain with diagram various equipment's used for the control of particulate pollutants. 10

Turn Over

QP Code: 26310

2

- Q.5 a. Draw a neat sketch of a typical sewage pumping station and describe in brief the functions of each. 08
- b. Explain in brief different testing methods for sewer pipes and why sewers run partially full. 06
- c. Design a circular primary settling tank for a town having a population of 50,000 with a water supply of 180 litres per capita per day. 06
- Q.6 Write short note on (any four) 20
- Sampling of sewage
 - Control measures of noise pollution
 - Recycling and reuse of waste water
 - Grit Chamber
 - Anti-siphonage pipe
 - Inverted siphon.



Q.P.Code: 018224

(3 Hours)

[Total Marks: 80]

Note: 1) Q1 is compulsory. Attempt any three out of remaining five questions.

- 2) Use of IS 1343:2012 is permitted in the examination.
- 3) Assume suitable data if required and mention it clearly.
- 4) Support answers and solutions with suitable sketches.

Q1. A] What do you mean by a load balancing cable? Sketch the profile of load balancing cable for the following cases.

1. A fixed ends beam subjected to uniformly distributed load on entire span.
2. A cantilever beam subjected to uniformly distributed load on entire span. [05]

B] Match the pairs for M45 concrete.

- | | |
|--------------------------------------------------------------------------------------|-----------------------------|
| 1. Principal tensile stress | a. 38.237×10^3 MPa |
| 2. Modulus of rupture | b. 1.61 MPa |
| 3. Young's modulus of elasticity of concrete | c. 36 MPa |
| 4. Maximum permissible compressive stress in flexure due to final prestress (Zone-I) | d. 17.1 MPa |
| 5. Permissible bearing stresses on concrete just behind the anchorages | e. 4.7 MPa |
- [05]

C] What are bottom and top kern points? Show that greater magnitude of loads can be counteracted if greater is the distance between kern points. [05]

D] Determine loss of stresses in cable1 and cable2 due to elastic deformation of concrete alone for a post tensioned beam for the following conditions.

- (i) Cables are tensioned and anchored simultaneously
- (ii) Cables are tensioned and anchored successively

Cross sectional dimension of beam are 250mmx450mm, cable1 is straight at 100mm below the neutral axis and cable2 is linear which is concentric at support and 100 below neutral axis at mid span. Prestressing force in each cable is 400kN. Take $m=6$. [05]

Q2. A post-tensioned concrete beam of 6m span and rectangular section 200mmx450mm is provided with two cables as under;

Cable	Position at support	Position at mid span	Profile	Effective PF
C1	150mm above n.a	150mm below n.a	Parabolic	300kN
C2	150mm below n.a	150mm below n.a	Straight	300kN

Grade of concrete is M50, f_p and f_{pi} are 1600 MPa and 1000 MPa respectively for prestressing steel. Calculate safe uniformly distributed imposed load such that beam is safe in limit state of flexure, shear. Take $\eta=0.8$ [20]

Q3.A] A cantilever portion of a prestressed concrete bridge with a rectangular cross section 600mm wide and 1600mm deep is 8m long and carries a reaction of 350kN (ultimate) from suspended span at the free end together with an uniformly distributed load (ultimate) of 60kN/m (inclusive of self weight). The beam is prestressed by 6 cables, each carrying a force of 1000kN, of which 3 are located at 150mm and 3 are located at 400mm from top edge. Cables are straight. Calculate principal tensile stress at a fiber 500mm from top and 500mm from bottom at 2m from support section and compare with respective permissible limit. Assume M40 concrete. [15]

B] Develop equations for the minimum sectional modulus to be provided for a prestressed concrete section such that section is safe in limit state of serviceability cracking. [05]

Q.P.Code: 018224

2

Q4. A] A post tensioned rectangular section 400mm wide and 1000mm deep has to carry an imposed load of 25kN/m on 10m simply supported span. Determine prestressing force and eccentricity. Suggest suitable cable profile and locate it in safe cable zone. The stresses in concrete must not exceed 17N/mm^2 in compression and 1.4N/mm^2 in tension at any time. 15% Loss in prestress may be assumed. [15]

B] Sketch stress vs strain variation for rectangular prestressed concrete section and hence develop the equation for Ultimate Moment of Resistance. [05]

Q5. A] The end block of a post-tensioned prestressed concrete beam is 250mm x 450mm which is subjected to a concentric force of 600kN by a Freyssenet anchorage (mild steel-circular plate) of 150mm diameter. Take $f_{ck}=50\text{MPa}$ and $f_{ci}=40\text{MPa}$. Ensure that concrete just behind the anchorages is safe against crushing and no punching of plate in the concrete takes place. Suggest suitable change in diameter of plate if needed. Also determine thickness of plate if sheathing duct diameter is 60mm. Design reinforcement to counter the bursting of the section. [10]

B] A simply supported concrete beam of 6m span is post tensioned by a parabolic cable with eccentricity 200mm below neutral axis at mid span and concentric at support.

Take; $E_s=200\text{kN/m}^2$, $E_c=35\text{kN/m}^2$, $\mu=0.2$, $K=0.004/\text{m}$, Anchorage Slip = 1mm, Shrinkage strain in concrete = 300×10^{-6} ,

Consider low relaxation and initial stresses in steel as $0.7f_p$ where $f_p=1500\text{MPa}$

Creep coefficient of concrete = 1.6

Rectangular cross section: 250mm x 500mm; Area of prestressing steel = 1500mm^2

Determine loss of stress in steel. [10]

Q6. A span continuous beam AB=BC=12m of 300mmx800mm below is prestressed by 1000kN force initially. Beam has to carry 15kN/m uniformly distributed load in addition to its self weight. Cable profile is parabolic which is concentric at supports having maximum eccentricity of 300mm below neutral axis at mid of spans. Draw pressure line at transfer and service stage. Take $\eta=0.8$ [20]

Q.P. Code :24959

[Time: Three Hours]

[Marks:80]

Please check whether you have got the right question paper.

- N.B:
1. Question no. 1 is compulsory.
 2. Solve any three questions out of remaining five.
 3. Assume data if required and mention the same.
 4. Draw the sketch if required.

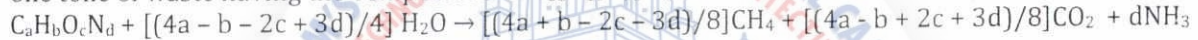
Q.1 Solve **any four** out of the following: (20)

- A) Explain factors affecting generation rate of solid waste.
- B) Write a note on E - waste.
- C) Why transfer stations are necessary? What are their various types?
- D) Write a note on material recovery facility.
- E) Differentiate SWM in developing & developed nations.

Q.2 A) Explain physical, chemical and biological transformation of solid waste. Explain the importance of transformation in SWM in general. (10)

- B) Describe the various types of collection systems employed for House-to-House. Compare the systems and state the best one with reasons. (10)

Q.3 A) Estimate the theoretical volume of methane gas that could be expected from anaerobic digestion of one tone of waste having the composition of $C_{55}H_{10}O_{35}N_2$. (10)



- i) Explain in brief about Bio-medical waste management. (05)
- ii) What is leachate? How it is controlled? (05)

Q.4 A) Classify solid waste with respect to source, generation, type and characteristics. (10)

- B) Draw a neat sketch of hauled container system and stationary containers system. Explain points of differentiation in both. (10)

Q.5 A) i) Calculate the energy content of solid waste having following composition. (05)

Components	% by mass
Carbon	35
Hydrogen	10
Oxygen	40
Nitrogen	8
Sulphur	3
Ash	4

- ii) What are the factors which affect the composting process? (05)

- i) Explain the functional elements of SWM with neat sketch. (05)
- ii) What are the factors to be considered while selecting landfill site. (05)

Q.6 Write short note on **any four**. (20)

- A) Pyrolysis
- B) Trench method of landfilling.
- C) Vermicomposting
- D) Segregation
- E) Incinerator
