

## POST GRADUATE COMMON ENTRANCE TEST - 2015

| DATE & TIME                        | COURSE                                                          | SUBJECT                           |
|------------------------------------|-----------------------------------------------------------------|-----------------------------------|
| 08-08-2015<br>10.30 AM TO 12.30 PM | ME / M.Tech/ M.Arch / Courses<br>Offered by VTU / UVCE / UBDTCE | ENVIRONMENTAL<br>ENGINEERING      |
| MAXIMUM MARKS                      | TOTAL DURATION                                                  | MAXIMUM TIME FOR ANSWERING        |
| 100                                | 150 MINUTES                                                     | 120 MINUTES                       |
| MENTION YOUR PG CET NO.            |                                                                 | QUESTION BOOKLET<br>SERIAL NUMBER |
|                                    |                                                                 | 325059                            |
|                                    |                                                                 | VERSION CODE                      |
|                                    |                                                                 | A - 3                             |

### DOs :

1. Check whether the PG CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. Ensure whether the circles corresponding to course and the specific branch have been shaded on the OMR answer sheet.
3. This question booklet is issued to you by the invigilator after the 2nd bell i.e., after 10.25 am.
4. The serial number of this question booklet should be entered on the OMR answer sheet.
5. The version code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
6. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

### DON'Ts:

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. **THE 3RD BELL RINGS AT 10.30 AM, TILL THEN;**
  - Do not remove the seal / staple present on the right hand side of this question booklet.
  - Do not look inside this question booklet.
  - Do not start answering on the OMR answer sheet.

### IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 75 (items) questions and each question will have one statement and four answers. (Four different options / responses.)
2. After the 3rd Bell is rung at 10.30 am, remove the seal / staple stapled on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 120 minutes:
  - Read each question (item) carefully.
  - Choose one correct answer from out of the four available responses (options / choices) given under each question / item. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **only one response** for each item.
  - Completely **darken / shade the relevant circle with a blue or black ink ballpoint pen against the question number on the OMR answer sheet.**
4. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
5. After the **last bell is rung at 12.30 pm**, stop marking on the OMR answer sheet and affix your left hand thumb impression on the OMR answer sheet as per the instructions.
6. Hand over the **OMR answer sheet** to the room invigilator as it is.
7. After separating the top sheet (KEA copy), the invigilator will return the bottom sheet replica (candidate's copy) to you to carry home for self evaluation.
8. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.
9. Only **Non-programmable** calculators are allowed.

### MARKS DISTRIBUTION

|          |                                             |
|----------|---------------------------------------------|
| PART - 1 | 50 QUESTIONS CARRY ONE MARK EACH (1 TO 50)  |
| PART - 2 | 25 QUESTIONS CARRY TWO MARKS EACH (51 - 75) |

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# ENVIRONMENTAL ENGINEERING

## PART - 1

(Each question carries one mark)

(50 X 1 = 50)

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| <p>1. The oxygen content in air is approximately:</p> <p>a. 20 %                      b. 60 %</p> <p>c. 40 %                      d. 78 %</p> <p>2. In the Gaussian Dispersion model for air pollution, <math>\sigma_z</math> refers to:</p> <p>a. VC</p> <p>b. Vertical dispersion coefficient</p> <p>c. MMD</p> <p>d. Horizontal dispersion coefficient</p> <p>3. In Bleaching powder, the amount of chlorine present is:</p> <p>a. 33 %                      b. 45 %</p> <p>c. 70 %                      d. 100 %</p> <p>4. The color of water is measured on a:</p> <p>a. Platinum Cobalt scale</p> <p>b. Turbidity scale</p> <p>c. <math>\text{CaCO}_3</math> scale</p> <p>d. <math>\text{NaNO}_3</math> scale</p> <p>5. 'Point of zero charge' (PZC) of carbon or carbon like sludge can be determined using:</p> <p>a. <math>\text{KNO}_3</math> or <math>\text{CaCO}_3</math></p> <p>b. <math>\text{KNO}_3</math> or <math>\text{NaCl}</math></p> <p>c. <math>\text{NaCl}</math> or <math>\text{CaCO}_3</math></p> <p>d. <math>\text{Na}_2\text{SO}_4</math> or <math>\text{CuSO}_4</math></p> | <p>6. Presence of high algal content in water indicates that the water is:</p> <p>a. Alkaline                      b. Acidic</p> <p>c. Neutral                      d. Soft</p> <p>7. TON refers to:</p> <p>a. Typical Oxygen Normal</p> <p>b. Threshold Odor number</p> <p>c. Tonnes of Cane</p> <p>d. Tons of Nitrates</p> <p>8. In a large lake, during stratification, the middle portion is called:</p> <p>a. Abyss</p> <p>b. Hypolimnion</p> <p>c. Epilimnion</p> <p>d. Thermocline</p> <p>9. Schmutzdecke layer is formed in:</p> <p>a. RSF                      b. SSF - 2</p> <p>c. SSF                      d. SDB</p> <p>10. Back washing water used in RSF accounts for about:</p> <p>a. 4 %                      b. 16 %</p> <p>c. 12 %                      d. 25 %</p> <p>11. Normal soil contains oxygen by:</p> <p>a. 80 %                      b. 60 %</p> <p>c. 100 %                      d. 25 %</p> |
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Space For Rough Work

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| <p>12. While preparing rapid EIA, the radius of influence of the project is:</p> <ol style="list-style-type: none"> <li>7 - 10 km</li> <li>30 - 50 km</li> <li>15 - 20 km</li> <li>70 - 80 km</li> </ol> <p>13. When attributes and activities are matched on a 'Matrix' sheet, the cells contain:</p> <ol style="list-style-type: none"> <li>Environment</li> <li>Importance only</li> <li>Magnitude only</li> <li>Magnitude &amp; Importance</li> </ol> <p>14. VFGs means:</p> <ol style="list-style-type: none"> <li>Valued Fluoride Goods</li> <li>Value Function Graphs</li> <li>Volatile Fluorosis Grids</li> <li>None of the above</li> </ol> <p>15. NDS means:</p> <ol style="list-style-type: none"> <li>Negative Declaration Statement</li> <li>Nitrogen Dissolved Sulfur</li> <li>Nickel Doped Sulfur</li> <li>None of the above</li> </ol> <p>16. The best season data that must be presented in REIA is:</p> <table border="0"> <tr> <td>a. Rainy</td> <td>b. Winter</td> </tr> <tr> <td>c. Summer</td> <td>d. Fall - spring</td> </tr> </table> | a. Rainy         | b. Winter | c. Summer | d. Fall - spring | <p>17. In adsorption processes (batch), the first step is:</p> <ol style="list-style-type: none"> <li>Film diffusion</li> <li>Intraparticle diffusion</li> <li>Pore diffusion</li> <li>All the above</li> </ol> <p>18. The BIS drinking water quality standards for drinking water falls in the range of:</p> <ol style="list-style-type: none"> <li>0.5 - 1 mg/L</li> <li>1.0 - 1.5 mg/L</li> <li>2.0 - 2.5 mg/L</li> <li>None of the above</li> </ol> <p>19. Iron causes color problems even at low concentrations of:</p> <ol style="list-style-type: none"> <li>6 mg/L</li> <li>&gt; 8 mg/L</li> <li><math>\geq 0.3</math> mg/L</li> <li><math>\leq 2</math> mg/L</li> </ol> <p>20. In the bacterial growth curve, the second growth phase is the:</p> <ol style="list-style-type: none"> <li>Lag phase</li> <li>Arithmetic phase</li> <li>Stationary phase</li> <li>Log phase</li> </ol> |
| a. Rainy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | b. Winter        |           |           |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| c. Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | d. Fall - spring |           |           |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

Space For Rough Work

21. The design period for water supply projects are for a period of:

- a. 10 years
- b. 15 - 20 years
- c. 30 - 40 years
- d. 20 - 30 years

22. Imhoff cone is used to determine:

- a. Volatile solids
- b. Suspended solids
- c. Settleable solids
- d. Total solids

23. The solids content in water is determined by:

- a. AAS
- b. Gravimetric method
- c. HPLC
- d. Titrimetric method

24. In Population projection forecasting, geometric increase represents:

- a.  $\frac{dp}{dt} \propto P$
- b.  $\frac{dp}{dt} = K$
- c.  $\frac{dp}{dt} = P$
- d.  $q \frac{dp}{dt} = t$

25. For effective coagulation to occur in water or waste water treatment, the most important water quality parameter is:

- a. Alkalinity
- b. Chlorides
- c. Total hardness
- d. Iron

26. In an ecosystem, pyramids of energy is:

- a. Multi directional
- b. Unidirectional
- c. Inverted
- d. None of the above

27. Aeration of water is carried out for the removal of:

- a. Odor
- b. Color
- c. Fluoride
- d. Hardness

28. In electrochemical coagulation, for medium strength waste waters, only two steps occur in sludge settling, they are:

- a. 2 and 3
- b. 1 and 4
- c. 1 and 2
- d. 1 and 3

29. In venturiflumes, the throat width size is:

- a. 100 cm
- b. 30 cm
- c. 40 cm
- d. 20 cm

Space For Rough Work

30. At the end of a Grit chamber, the device normally placed is:
- Proportional weir
  - Venturimeter
  - Turbine
  - Pump
31. Wind speeds are measured using an:
- Anemometer
  - Barometer
  - HVAS
  - Impinger tube
32. The acronym CSI means:
- Centrifugal settleability index
  - Central suspended index
  - Carbon sludge index
  - None of the above
33. Mottling of teeth enamel disease is related to the parameter:
- Fluoride
  - Nitrates
  - Arsenic
  - Phosphorus
34. The permissible limit for nitrate in drinking water is:
- $\leq 45$  mg/L
  - $\geq 60$  mg/L
  - 300 mg/L
  - 1500 mg/L
35. In water distribution systems, the minimum pressure head to be maintained should be:
- 10 - 12 m
  - 6 - 8 m
  - 12 - 15 m
  - 8 - 10 m
36. Corrosion in sewer pipes is mainly because of:
- CO<sub>2</sub>
  - H<sub>2</sub>S
  - O<sub>2</sub>
  - C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>
37. A velocity cap in Intakes is designed not to allow:
- Whales
  - Sharks
  - Fish
  - Turtles
38. The conversion factor from MLD to m<sup>3</sup>/s is:
- 1.1343
  - 0.11569
  - 1.9234
  - 0.011574
39. Now a days, 'n' value in the velocity calculations for sewer design is taken as:
- 0.023
  - 0.103
  - 0.013
  - 0.333
40. The waste waters become non-bio degradable if COD:BOD ratios are:
- $\geq 3.0$
  - $\leq 2.2$
  - 5
  - 7

Space For Rough Work

41. In fact, aeration is required strictly for:
- Ground water
  - Surface water
  - Salt water
  - All the above
42. While designing sedimentation tanks, the most important parameter that decides the diameter is:
- S.O.R
  - H.R.T
  - S.V.I
  - D.O
43. The valve which allows uni-directional flow of water in a pipe is called:
- Sluice valve
  - Reflux valve
  - Gate valve
  - Air valve
44. In a water tank, over flow pipes are provided at:
- FSL
  - MWL
  - Floor level
  - NWL
45. As a norm, a rural population having more than 1000 persons, should be provided with:
- BW (HP)
  - MWS
  - PWS
  - None of the above
46. In an attached growth system, the sludge - like material that separates out from the substrate is called:
- Sloughing
  - Terminator
  - Maceration
  - Communion
47. The most updated version of the ASP today is:
- Lagoon
  - UASB
  - RBC
  - MBR
48. The best method to dispose off municipal solid wastes today is:
- Burning in open
  - Plasma
  - SLF
  - Complete Incineration
49. In air pollution, 'Pasquill Stability Class' is of types:
- B - F
  - A - C
  - A - D
  - A - F
50. When the ELR meets the DALR, one can obtain:
- Pressure
  - Wind speed
  - MMD
  - VC

Space For Rough Work

**PART - 2**

(Each question carries two marks)

**(25 X 2 = 50)**

51. In designing settling tanks, of circular type, the vertical settling velocity should be:
- a.  $> v_n$
  - b.  $< v_n$
  - c.  $= v_n$
  - d. None of the above
52. In 'Value functions' the X-axis and Y-axis are:
- a. Environmental Quality and Parameter
  - b. Parameter and Environmental quality
  - c. Subjectivity and TON
  - d. None of the above
53. The best style to design and lay a waste water treatment facility is:
- a. Linear style
  - b. Campus style
  - c. Random style
  - d. Compact style
54. Soluble colloidal particles that remain after electrochemical coagulation of waste water can be easily removed by:
- a. Adding alum
  - b. Adding Sulfur
  - c. Adding Polymer aid
  - d. Adding salts of iron
55. The pivot of the rotating arm of the Trickling filter unit is placed on:
- a. Solid carbon
  - b. Liquid nitrogen
  - c. Liquid oxygen
  - d. Mercury liquid
56. Recent advances in membranes show that the material used for membranes is:
- a. PVDF
  - b. Ceramic
  - c. PVC
  - d. Clay
57. In sludge settling in a column, Type IV refers to:
- a. Compression settling
  - b. Hindered settling
  - c. Zone settling
  - d. All of the above
58. All waste water (domestic/industrial) treatment facilities must be designed for:
- a. Average flow
  - b. Maximum flow
  - c. Minimum flow
  - d. All the above

**Space For Rough Work**

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| <p>59. Waste water coming out from kitchens and washing clothes are referred to:</p> <ul style="list-style-type: none"> <li>a. Grey water</li> <li>b. Black water</li> <li>c. Pink water</li> <li>d. Dark water</li> </ul>         | <p>63. In comprehensive EIA, the radius of influence of the project on the environment is</p> <ul style="list-style-type: none"> <li>a. 100 km</li> <li>b. 25 km</li> <li>c. 10 km</li> <li>d. 500 km</li> </ul> |
| <p>60. In sanitary land fills, the layer of material placed at the bottom of it is made of:</p> <ul style="list-style-type: none"> <li>a. Rubber</li> <li>b. Polymer</li> <li>c. Metal grids</li> <li>d. Bentonite clay</li> </ul> | <p>64. To obtain EIUs, in EIA, one has to multiply EQs by:</p> <ul style="list-style-type: none"> <li>a. PIUs</li> <li>b. mg/L</li> <li>c. %</li> <li>d. meq/L</li> </ul>                                        |
| <p>61. Solid waste Abhiyan in India focusses on:</p> <ul style="list-style-type: none"> <li>a. Reactive approach</li> <li>b. Continuous reactive approach</li> <li>c. Proactive approach</li> <li>d. P2</li> </ul>                 | <p>65. Wherever Igneous rocks are encountered, one can expect:</p> <ul style="list-style-type: none"> <li>a. Hard water</li> <li>b. Soft water</li> <li>c. Brackish water</li> <li>d. Cold water</li> </ul>      |
| <p>62. Most air pollution episodes have occurred in the season:</p> <ul style="list-style-type: none"> <li>a. Summer</li> <li>b. Rainy</li> <li>c. Winter</li> <li>d. All the above</li> </ul>                                     | <p>66. Excess aluminum in water causes a disease in children called:</p> <ul style="list-style-type: none"> <li>a. Leprosy</li> <li>b. Inflammation</li> <li>c. Dysentery</li> <li>d. Dementia</li> </ul>        |

Space For Rough Work

67. In Langmuir Isotherm,  $q_e$  refers to:
- X/M
  - M/X
  - X/n
  - n/X
68. In water mains, air valves are provided at:
- Near pumps
  - Pipe junctions
  - Highest points
  - Low points
69. The last phase the population growth curve is:
- Lag phase
  - Survival phase
  - Endogenous phase
  - Log phase
70. Schistosomiasis is caused by:
- Bacteria
  - Crustaceans
  - Virus
  - Protozoans
71. One of the following is an algicide:
- Alum
  - $\text{CuSO}_4$
  - $\text{Al}_2\text{SO}_3$
  - $\text{NaNO}_3$
72. In RSF units, the length to width ratio should not exceed:
- 11
  - 15
  - 45
  - 20
73. The chloride content in water (treated) for public supplies should not exceed:
- 100 mg/L
  - 150 mg/L
  - 250 mg/L
  - 290 mg/L
74. Two most important parameters for a successful electrocoagulation in waste water treatment are:
- Chlorides and Alkalinity
  - Alkalinity and Sulphates
  - Sulphates and Nitrates
  - Nitrates and Phosphates
75. In the beginning of the EC process for water treatment, the kind of corrosion is:
- Wave corrosion
  - Pitting corrosion
  - Edge corrosion
  - None of the above

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