

## POST GRADUATE COMMON ENTRANCE TEST-2018

DATE and TIME	COURSE	SUBJECT
14-07-2018 2.30 p.m. to 4.30 p.m.	ME/M.Tech/M.Arch/ courses offered by VTU/UVCE/UBDTCE	ENVIRONMENTAL ENGINEERING
<b>MAXIMUM MARKS</b>	<b>TOTAL DURATION</b>	<b>MAXIMUM TIME FOR ANSWERING</b>
100	150 Minutes	120 Minutes
<b>MENTION YOUR PGCET NO.</b>		<b>QUESTION BOOKLET DETAILS</b>
		<b>VERSION CODE</b>
		<b>SERIAL NUMBER</b>
		A
		109033

### DOs :

1. Candidate must verify that the PGCET number & Name printed on the OMR Answer Sheet is tallying with the PGCET number and Name printed on the Admission Ticket. Discrepancy if any, report to invigilator.
2. This question booklet is issued to you by the invigilator after the 2<sup>nd</sup> bell i.e., after 2.25 p.m.
3. The Version Code of this Question Booklet should be entered on the OMR Answer Sheet and the respective circle should also be shaded completely.
4. The Version Code and Serial Number of this question booklet should be entered on the Nominal Roll without any mistakes.
5. 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 3<sup>rd</sup> Bell rings at 2.30 p.m., till then;
  - Do not remove the paper seal / polythene bag 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 3<sup>rd</sup> Bell is rung at 2.30 p.m., remove the paper seal / polythene bag 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.

ಸರಿಯಾದ ಕ್ರಮ CORRECT METHOD	ತಪ್ಪು ಕ್ರಮಗಳು WRONG METHODS

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 4.30 p.m., stop marking on the OMR answer sheet and affix your left hand thumb impression on the OMR answer sheet as per the instructions.
6. Handover 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 TO 75)





# ENVIRONMENTAL ENGINEERING

## PART – A

Each question carries one mark.

(50 × 1 = 50)

1. Which is the correct statement regarding per capita demand ?
  - (A) Daily water required by an individual
  - (B) Water required for various purposes by a person
  - (C) Water required by an individual in a year
  - (D) Annual average amount of daily water required by one person
2. What is the design period for the water treatment unit ?
  - (A) 10 years
  - (B) 15 years
  - (C) 20 years
  - (D) 30 years
3. Which method of population forecast combines both arithmetical increase and geometrical increase method ?
  - (A) Arithmetical increase method
  - (B) Geometrical increase method
  - (C) Incremental increase method
  - (D) Decreased rate of growth method
4. Identify the correct relation between the following ?
  - (A) Dissolved solid = Total solid + Suspended solid
  - (B) Dissolved solid = Total solid – Suspended solid
  - (C) Total solid = Dissolved solid / Suspended solid
  - (D) Dissolved solid = Suspended solid – Total solid

Space For Rough Work

5. What is the full form of NTU in context with turbidity ?
- (A) Number of transfer unit
  - (B) Neurological turbidity unit
  - (C) Nephelometric turbidity unit
  - (D) Network terminal unit
6. \_\_\_\_\_ represents the bacterial density that is most likely to be present in water.
- (A) BOD
  - (B) COD
  - (C) MPN
  - (D) Coliform index
7. Which bacteria cause the reddish brown deposits in the tank ?
- (A) Escherichia coli bacteria
  - (B) Bacterium coli bacteria
  - (C) Iron bacteria
  - (D) Sulphur bacteria
8. Which of the following process is used to remove the colloidal particles from water ?
- (A) Chemical precipitation
  - (B) Chemical coagulation
  - (C) Ion exchange
  - (D) Adsorption
9. In which process, excess lime is converted into bicarbonate ?
- (A) Chlorination
  - (B) Liming
  - (C) Re-carbonation
  - (D) Super-chlorination
10. Which process of water treatment is done to avoid floating debris, branches, trees or other large particles suspended in water ?
- (A) Screening
  - (B) Aeration
  - (C) Primary sedimentation
  - (D) Secondary sedimentation

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Space For Rough Work

11. Identify the incorrect statement regarding aeration process :

- (A) It removes taste and odour
- (B) It increases the dissolved oxygen content of water
- (C) It increases the carbon dioxide content of water
- (D) It is used for mixing chemicals with water

12. Which of the following represents the correct relation between displacement velocity and diameter of the particle ?

- (A)  $v_1 = (8Bg (G-1) d/f)^{1/2}$
- (B)  $v_1 = (8Bg (G-1) d^2/f)^2$
- (C)  $v_1 = (8Bg (G-1) d/f)$
- (D)  $v_1 = (8Bg (G-1) d/f)^2$

13. In a rectangular horizontal flow tank, the maximum permissible velocity is \_\_\_\_\_ m/sec.

- (A) 3
- (B) 0.3
- (C) 0.03
- (D) 0.003

14. In which type of sedimentation, flocculent suspension of high concentration takes place ?

- (A) Type I sedimentation
- (B) Type II sedimentation
- (C) Type III sedimentation
- (D) Type IV sedimentation

15. When impurities are separated by the gravitation of settling particles, the operation is called \_\_\_\_\_.

- (A) Sedimentation with coagulant
- (B) Plain sedimentation
- (C) Secondary sedimentation
- (D) Disinfection

Space For Rough Work

16. The detention period of a rectangular tank is given by

(A)  $t_0 = LBH/Q$

(B)  $t_0 = LB/HQ$

(C)  $t_0 = Q/LBH$

(D)  $t_0 = HQ/LB$

17. Detention time for a circular tank is given by

(A)  $t = D(D + 0.785H)/Q$

(B)  $t = D(0.1D + 0.785H)/Q$

(C)  $t = D_2(0.01D + 0.785H)$

(D)  $t = D_2(0.01D + 0.785H)/Q$

18. Alum is effective when pH of water is between \_\_\_\_\_

(A) 8-10

(B) 6-8

(C) 6.5-8.5

(D) 7-9

19. Why Magnesium carbonate is not commonly preferred as coagulant ?

(A) It is expensive

(B) It does not remove colour

(C) Formation of sludge

(D) The time required for floc formation is less

20. The rate of change of velocity per unit distance normal to a section is called \_\_\_\_\_

(A) Mean velocity

(B) Average velocity

(C) Mean velocity gradient

(D) Velocity gradient

21. The slow sand filter is designed for

(A) Maximum daily demand

(B) Maximum yearly demand

(C) Average daily demand

(D) Maximum weekly demand

Space For Rough Work

22. Which minor method of disinfection is effective in complete sterilization of water ?

- (A) Boiling method
- (B) Excess lime treatment
- (C) Silver treatment
- (D) Ultraviolet ray treatment

23. Zeolites are complex compound of

- (A) Aluminium and lime
- (B) Silica and soda
- (C) Aluminium, silica and soda
- (D) Lime and soda

24. Which of the following desalination method is more suitable for brackish water than sea water ?

- (A) Distillation
- (B) Solar evaporation
- (C) Reverse osmosis
- (D) Freezing

25. The expression of the Chezy's formula is given by

- (A)  $V = C/RS$
- (B)  $V = CRS^2$
- (C)  $V = C (RS)^{1/2}$
- (D)  $V = C / (RS)^{1/2}$

26. Which joint in the sewer is known as ring tie coupling ?

- (A) Bell and spigot joint
- (B) Collar joint
- (C) Mechanical joint
- (D) Simplex joint

27. Negative projecting condition is a type of \_\_\_\_\_ condition.

- (A) Trench ditch
- (B) Trench
- (C) Tunnel
- (D) Embankment

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Space For Rough Work

28. The minimum thickness of the side wall of the manhole is

- (A) 50 mm
- (B) 100 mm
- (C) 225 mm
- (D) 300 mm

29. The aerobic decomposition of carbonaceous organic matter gives

- (A) Nitrites and water
- (B) Carbon dioxide and water
- (C) Sulfates and water
- (D) Nitrogen and Ammonia

30. The biochemical oxygen demand is computed by

- (A) Dissolved oxygen / Dilution factor
- (B) Dissolved oxygen + Dilution factor
- (C) Dissolved oxygen - Dilution factor
- (D) Dissolved oxygen \* Dilution factor

31. In which of the following, large impurities are attached with air bubbles to remove it from the wastewater ?

- (A) Sludge digestion tank
- (B) Primary sedimentation
- (C) Vacuum floatation
- (D) Oxidation pond

32. The size of filter media in a high rate trickling filter is

- (A) 10-20 mm
- (B) 34-68 mm
- (C) 25-60 mm
- (D) 20-50 mm

33. Which of the following process is not involved in sludge thickening ?

- (A) Gravity thickening
- (B) Vacuum filter
- (C) Air flotation
- (D) Centrifugation

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Space For Rough Work



34. The process of burning of municipal solid waste at high temperature is called
- (A) Incineration
  - (B) Composting
  - (C) Land filing
  - (D) Shredding
35. The process of decomposition of biodegradable solid waste by earthworms is called
- (A) Landfills
  - (B) Shredding
  - (C) Vermi-composting
  - (D) Composting
36. Which of the following is involved in production of carboxyhaemoglobin ?
- (A) CO
  - (B) SO<sub>2</sub>
  - (C) NO<sub>2</sub>
  - (D) NO<sub>3</sub>
37. Which of the following is a secondary air pollutant ?
- (A) SPM
  - (B) PAN
  - (C) SO<sub>2</sub>
  - (D) NO<sub>2</sub>
38. Which of the following removes both gaseous and particulate contaminants ?
- (A) Venturi scrubber
  - (B) Gravitational settling chamber
  - (C) Dynamic precipitator
  - (D) Wet scrubber
39. Which of the following is the absorption unit ?
- (A) Cyclone collector
  - (B) Plate tower
  - (C) Gravitation settling chamber
  - (D) Dynamic precipitator

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Space For Rough Work

40. Non-Dispersive Ultraviolet (NDUV) analysers are primarily used to detect which of the following two gases ?
- (A) Oxygen and Carbon dioxide
  - (B) Oxygen and Nitrogen dioxide
  - (C) Nitrogen dioxide and Sulphur dioxide
  - (D) Sulphur dioxide and Oxygen
41. Which of the following pollutants is the major contributor to photochemical smog ?
- (A) Peroxynitrates
  - (B) Hydroperoxides
  - (C) Nitrogen dioxide
  - (D) Ozone
42. How does increase in temperature affect air pollution ?
- (A) Higher temperatures reduce air pollution
  - (B) Higher temperatures increase air pollution
  - (C) Temperature does not affect the air pollution levels
  - (D) Humidity factor is also necessary to predict variance of air pollution with temperature
43. How does lead affect the human body ?
- (A) Increases blood pressure
  - (B) Damages the cerebellum, liver and kidney
  - (C) Leads to reproductive disorders and osteoporosis
  - (D) All of the mentioned
44. How does atmospheric pressure vary with increase in altitude ?
- (A) It decreases linearly
  - (B) It decreases exponentially
  - (C) It increases linearly
  - (D) It increases till stratosphere and then starts decreasing exponentially
45. Which of the following statements is true ?
- (A) Troposphere is equally thick across different parts of the world
  - (B) Troposphere contains the ozone layer
  - (C) Troposphere is thinner at the equator than at the poles
  - (D) Troposphere is thicker at the equator than at the poles

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Space For Rough Work

46. Ever since the industrial revolution, by how much has the average temperature of the Earth increased ?
- (A) 0.24 °C
  - (B) 0.6 °C
  - (C) 1.2 °C
  - (D) 1.8 °C
47. Which is the most abundant greenhouse gas in the atmosphere ?
- (A) Carbon dioxide
  - (B) Water vapour
  - (C) Methane
  - (D) Nitrogen
48. Who discovered the ozone layer ?
- (A) Henri Buisson & Charles Fabry
  - (B) Carl Sagan & Charles Fabry
  - (C) G.M.B Dobson
  - (D) Carl Sagan & G.M.B Dobson
49. Below which of the following pH is rain regarded as 'acid rain' ?
- (A) 7
  - (B) 7.3
  - (C) 5.6
  - (D) 6
50. Which of the following gases are main contributors to acid rain ?
- (A) Carbon dioxide and carbon monoxide
  - (B) Sulphur dioxide and carbon dioxide
  - (C) Sulphur dioxide and nitrogen dioxide
  - (D) Sulphur dioxide and nitrous oxide

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Space For Rough Work

PART - B

(Each question carries two marks)

(25 × 2 = 50)

51. The expected discharge to be obtained from an open well sunk in coarse sand is 0.0059 cumec. If the working depression head of the well is 3 m, the minimum diameter of the well, is
- (A) 2 m  
(B) 2.25 m  
(C) 2.50 m  
(D) 3.00 m
52. Mathamoglobinemia or blue baby disease is caused due to
- (A) Chlorides  
(B) Nitrites  
(C) Nitrates  
(D) Sulphides
53. To control the growth of algae in reservoirs, the compound which is used, is
- (A) Bleaching powder  
(B) Copper sulphate  
(C) Lime solution  
(D) Alum solution
54. The bacterias which require free oxygen for their survival, are called
- (A) Aerobic bacterias  
(B) Anaerobic bacterias  
(C) Facultative bacteria  
(D) None of these
55. The bed slope in slow sand filters, is generally kept
- (A) 1 in 50  
(B) 1 in 75  
(C) 1 in 100  
(D) 1 : 200
56. The water level in an open well was depressed by pumping 2.5 m and recuperated 2.87 m in 3 hours and 50 minutes. The yield of the well per minute is
- (A) 0.0033  
(B) 0.0044  
(C) 0.0055  
(D) 0.0066

Space For Rough Work

57. For calculation of economical diameter  $D$  of a pipe in metres for a discharge  $Q$  to be pumped in cumecs, Lea suggested the empirical formula
- (A)  $D = 0.22 Q$   
 (B)  $D = 1.22 Q$   
 (C)  $D = 2.22 Q$   
 (D)  $D = 3.22 Q$
58. The pH value of water is kept slightly less than 7 so that hydrochloride ions may combine with ammonia ions to form
- (A) Mono-chloramine ( $\text{NHCl}$ )  
 (B) Di-chloramine ( $\text{NH}_2\text{Cl}$ )  
 (C) Nitrogen tri-chloramine ( $\text{NCl}_3$ )  
 (D) All the above
59. If  $L$ ,  $B$  and  $D$  length, breadth and depth of water in a rectangular sedimentation tank of total discharge  $Q$ , the settling velocity, is
- (A)  $Q/H$   
 (B)  $Q/D$   
 (C)  $Q/(D \times B)$   
 (D)  $Q/(L \times B)$
60. If  $G$  is the specific gravity of particles of diameter  $d$ , the velocity of settlement  $V$  in still water at  $T^\circ\text{C}$ , according to Stoke's law, is
- (A)  $V = 418 (G - 1) d^2 [(3T + 70)/100]$   
 (B)  $V = 418 (G - 1) d [(3T - 70)/100]$   
 (C)  $V = 418 (G - 1) d^2 [(2T + 70)/100]$   
 (D)  $V = 418 (G - 1) d^4 [(3T + 70)/100]$
61. Recuperation test is carried out to determine
- (A) Turbidity of water  
 (B) pH value of water  
 (C) Yield of well  
 (D) Discharge from a well
62. Which of the following is called as a conventional trickling filter ?
- (A) Rapid sand filter  
 (B) Slow sand filter  
 (C) High rate trickling filter  
 (D) Low rate trickling filter

Space For Rough Work

63. The hydrogen sulfide gas formed during the filtration of sewage can be removed by
- Carbonation
  - Chlorination
  - Addition of lime
  - Titration with potassium dichromate
64. With which device, the air is introduced in the aeration tank ?
- Diffuser plate
  - Paddles
  - Cone with spiral vanes
  - Header pipe
65. The oxygen deficit is maximum when
- Rate of reaeration is 0
  - Rate of deoxygenation is 0
  - Rate of reaeration equals the rate of deoxygenation
  - Rate of reaeration > rate of deoxygenation
66. The reoxygenation constant at temperature 'T' is expressed by
- $K_{RT} = K_{R20} (1.016)^T$
  - $K_{RT} = K_{R20} (1.047)^{T-20}$
  - $K_{RT} = K_{R20} (1.016)^{T-20}$
  - $K_{RT} = K_{R20} (1.047)^T$
67. \_\_\_\_\_ is the process of acceleration of eutrophication due to increased phosphorous content in lakes.
- Photosynthesis
  - Chemical eutrophication
  - Cultural eutrophication
  - Custom eutrophication
68. Which air pollutant cause corrosion of building ?
- SO<sub>2</sub>
  - SO<sub>3</sub>
  - CO
  - NO<sub>2</sub>
69. Concentration of fluorine that cause a phototoxicological effect on the plant is
- 0.1 μg/m<sup>3</sup>
  - 0.3 μg/m<sup>3</sup>
  - 0.5 μg/m<sup>3</sup>
  - 1 μg/m<sup>3</sup>

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Space For Rough Work

70. The chimney is emitting particulate matter. Which of the following is the correct expression of the height of the chimney ? Here ' $K_p$ ' represents the emission of particulate matter.
- (A)  $HC = 74 K_p^{0.27}$
  - (B)  $HC = 14 K_p^{0.27}$
  - (C)  $HC = 14 K_p^{0.47}$
  - (D)  $HC = 74 K_p^{0.33}$
71. Coning plume occurs under which conditions ?
- (A) Super adiabatic
  - (B) Sub adiabatic
  - (C) Neutral
  - (D) Inversion
72. Which of the following are classified as major sources to air pollution ?
- (A) Fuel consumption by local citizens
  - (B) Sewage treatment plants
  - (C) Dry cleaning and laundries
  - (D) None of the mentioned
73. What does the abbreviation VOC stand for ?
- (A) Versatile Oxygenated Compounds
  - (B) Volatile Oxygenated Compounds
  - (C) Volatile Organic Carbons
  - (D) Volatile Organic Compounds
74. What does the process of carbon sequestration mean ?
- (A) Removal of  $CO_2$  from the atmosphere
  - (B) Storage of  $CO_2$  by depositing in reservoir
  - (C) Both of the mentioned
  - (D) None of the mentioned
75. What is the size range of respirable suspended particulate matter ?
- (A) Less than 1 micrometre
  - (B) Less than 10 micrometre
  - (C) Less than 100 micrometre
  - (D) Less than 0.1 micrometre

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