

Seat No.	
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M.Phil./Ph.D. Entrance Examination, October - 2018
**ENVIRONMENTAL ENGINEERING / ENVIRONMENTAL
SCIENCE AND ENGINEERING**

Day and Date : Tuesday, 09 - 10 - 2018

Total Marks : 100

Time : 12.00 noon to 02.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Each question carries 2 marks.
 - 3) Answers should be marked in the given OMR answer sheet by darkening the appropriate option.
 - 4) Use black pen only for marking the circle. Do not make any stray mark on the Answer Sheet.
 - 5) Follow the instructions given on OMR Sheet.
 - 6) Rough work should be done on the sheet provided at the end of question paper.
 - 7) Only non-programmable calculators are allowed.

Paper - I

- 1) Slightly soluble gases such as oxygen and nitrogen encounter more resistance in :
 - A) Gas film
 - B) Liquid film
 - C) Both gas and liquid films
 - D) Neither gas film nor liquid film

- 2) In a water having low colloidal concentration the predominant mechanism of coagulation is
 - A) Adsorption and charge neutralization
 - B) Sweep coagulation
 - C) Both A and B
 - D) Inter-particle bridging

P.T.O.

- 3) Rising sludge problem is caused by
- A) Nitrification
 - B) Denitrification
 - C) Both nitrification and denitrification
 - D) Anaerobic decomposition

- 4) Match List I with List II and select the correct answer using the code given below the lists :

List - I		List - II	
(APC Equipment)		(Pollutant removed)	
a) ESP		1. Coarse particles	
b) Cyclones		2. Fine dust	
c) Wet scrubber		3. Gas	
d) Adsorbers		4. Sulphur dioxide	
Code: a	b	c	d
A) 2	1	3	4
B) 1	2	3	4
C) 2	1	4	3
D) 1	2	4	3

- 5) Which of the following statements related to C/N ratio are correct?
- i) Lower initial C/N ratio leads to loss of nitrogen and slows down the rate of decomposition;
 - ii) Higher initial C/N ratio leads to cell destruction to obtain nutrition;
 - iii) Higher C/N ratio leads to lower conservation of nitrogen in the finished compost;
 - iv) An initial ratio of 30 to 50 is optimal for composting;
- A) i, ii, iii and iv
 - B) i, ii and iii
 - C) i, iii and iv
 - D) ii, iii and iv

- 6) Proximate analysis is carried out to determine
- A) Combustion property of solid waste
 - B) Composition of solid waste
 - C) Combustion property of liquid waste
 - D) Composition of liquid waste
- 7) Amongst the various sewage treatment methods, for the same discharge, the smallest volume is needed for:
- A) Oxidation pond
 - B) Oxidation ditch
 - C) Aerated lagoon
 - D) Aeration tank of conventional activated sludge process
- 8) The minimum solid waste compaction ratio reported by the manufacturer of a high-pressure compaction machine is 8:1. The corresponding percent volume reduction of the solid waste is
- A) 88.88
 - B) 87.5
 - C) 12.50
 - D) 11.12
- 9) An ambulance siren causes a sound pressure of 200 μ bar. Use a reference sound pressure 0.0002 μ bar. The sound pressure level of the siren is
- A) 120 dB
 - B) 200 dB
 - C) 6 dB
 - D) 230 dB

Data for Q.10 and 11 :

A uniform filter medium 0.65 m deep has a porosity of 0.4. The sand particle has settling velocity is 0.07 m/s. The sand bed is to be expanded by hydraulic backwash.

- 10) The backwash velocity required for expanding a uniform bed of sand to a porosity of 0.7 is
- A) 0.016 m/s
 - B) 0.0138 m/s
 - C) 0.00138 m/s
 - D) 0.012 m/s

11) The height of sand bed after expansion to porosity of 0.7 is

- A) 1.3 m
- B) 1.0 m
- C) 0.9 m
- D) 1.2 m

Data for Q.12 and 13 :

Raw sludge has moisture content of 99% and after thickening its moisture content is reduced to 96%.

12) The reduction in volume of sludge is

- A) 3%
- B) 25%
- C) 97%
- D) 75%

13) The reduction in mass of solids is

- A) 0%
- B) 3%
- C) 100%
- D) 75%

Data for Q.14 and 15 :

A settled sewage of 5 mld flow with BOD of 120 mg/L is applied to 1.5 m deep low rate trickling filter with an organic loading of 12000 kgBOD/ha.m.d.

14) The hydraulic loading on the filter is

- A) 150 mld/ha
- B) 120 mld/ha
- C) 300 mld/ha
- D) 125 mld/ha

15) The area of trickling filter is

- A) 364 m²
- B) 500 m²
- C) 333 m²
- D) 400 m²

Paper - II (Research Methodology)

- 26) The data collected by a researcher is divided based on quality, quantity and repeatability. Some of this data is further selected using the random digit table. This is technically called as
- A) Structured sampling B) Stratified sampling
C) Representative sampling D) Stratified random sampling
- 27) Formulation of hypothesis may NOT be required in :
- A) Survey method B) Historical studies
C) Normative studies D) Experimental studies
- 28) Attributes of objects, events or things which can be measured are called
- A) Data B) Variables
C) Qualitative measure D) All of these
- 29) Factorial Analysis is used to :
- A) test the Hypothesis
B) know the difference between two variables
C) know the relationship between two variables
D) know the difference among the many variables
- 30) The research that applies the laws at the time of field study to draw more and more clear ideas about the problem is :
- A) Experimental research B) Applied research
C) Action research D) None of these

- 31)** Bibliography given in a research report:
- A) has no relevance to research
 - B) shows vast knowledge of the researcher
 - C) helps those interested in further research
 - D) all the above
- 32)** Which of the following measure of central tendency is appropriate for analyzing nominal data?
I. Mean, II. Mode, III. Median and IV. Range.
Select the correct answer using the codes given below :
- A) I only
 - B) II only
 - C) II and III
 - D) I and II
- 33)** Validity of research can be improved by
- A) Taking true representative sample from the data
 - B) Considering extraneous factors
 - C) Both A and B
 - D) Neither A nor B
- 34)** The significant result in a chi-square test implies that
- A) Homogeneity of variance has been established
 - B) Homogeneity of variance has not been established
 - C) Sample is representative of the data
 - D) Sample is not representative of the data
- 35)** There are two types of error associated with testing of hypothesis viz. type I and type II. Type I error occurs when
- A) The null hypothesis is rejected even though it is true
 - B) The null hypothesis is accepted even though it is false
 - C) Both the null hypothesis as well as alternative hypothesis are rejected
 - D) None of the above

- 36)** The term used in experimental research
- A) Experimental group
 - B) Controlled group
 - C) Both A and B
 - D) No such terms are used
- 37)** The method of controlling adopted for conducting experiment on a large data is/are
- A) Elimination
 - B) Randomization
 - C) Matching and elimination
 - D) Both A and B
- 38)** Which is the critical stage in research process?
- A) Literature survey
 - B) Problem formulation
 - C) Experimental work
 - D) Results, analysis and conclusions
- 39)** Which type/s of article can be published in journals?
- A) Review
 - B) Discussion
 - C) Both A and B
 - D) None of these
- 40)** Tippit table refers to _____
- A) Table of random digits
 - B) Table used in sampling methods
 - C) Table used in statistical investigations
 - D) All the above

- 41) I) Interview with a detailed schedule is called structural interview.
II) Interview with a detailed schedule is called direct interview.
Choose the correct answer
- A) Both I and II are correct B) Both I and II are incorrect
C) I is correct and II is incorrect D) I is incorrect and II is correct
- 42) A research paper is a brief report of research work based on
- A) Primary Data only B) Secondary Data only
C) Both Primary and Secondary Data D) None of the above
- 43) Research is not considered ethical if it
- A) is not of a very high standard
B) tries to prove a particular point
C) does not investigate the data scientifically
D) does not ensure privacy and anonymity of the respondent
- 44) When two or more successive footnotes refer to the same work which one of the following expressions is used?
- A) et.al B) op.cit
C) loc.cit D) ibid
- 45) Ex Post Facto research means
- A) The research is carried out after the incident
B) The research is carried out prior to the incident
C) The research is carried out along with the happening of an incident
D) The research is carried out keeping in mind the possibilities of an incident

Rough Work