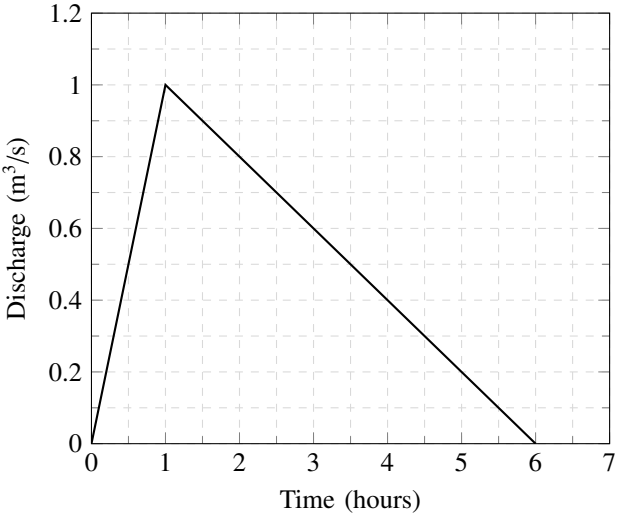
2016-CE-'14-26'

EE24BTECH11023

1) The direct runoff hydrograph in response to 5 cm rainfall excess in a catchment is shown in the figure. The area of the catchment (expressed in hectares) is:



2) The type of flood routing (Group I) and the equation(s) used for the purpose (Group II) are given below:

a) Group I:
   i) P. Hydrologic flood routing
   ii) Q. Hydraulic flood routing

b) Group II:
   i) 1. Continuity equation
   ii) 2. Energy equation
   iii) 3. Momentum equation

The correct match is:

a) P-1, Q-2
b) P-1, Q-1, 2, and 3
c) P-1 and 2, Q-1 only
d) P-1 and 3, Q-2

3) The pre-jump Froude Number for a particular flow in a horizontal rectangular channel is 10. The ratio of sequent depths (i.e., post-jump depth to pre-jump depth) is:
4) Pre-cursors to photochemical oxidants are:
   a) NO_x, VOCs, and sunlight

b) SO_2, CO_2, and sunlight
c) H_2S, CO, and sunlight
d) SO_2, NH_3, and sunlight

5) Crown corrosion in a reinforced concrete sewer is caused by:

a) H_2S b) CO_2 c) CH_4 d) NH_3

6) It was decided to construct a fabric filter, using bags of 0.45 m diameter and 7.5 m long, for removing industrial stack gas containing particulates. The expected rate of airflow into the filter is 10 m^3/s. If the filtering velocity is 2.0 m/min, the minimum number of bags (rounded to the nearest higher integer) required for continuous cleaning operation is:

a) 27 b) 29 c) 31 d) 32

7) Match the items in Group-I with those in Group-II and choose the correct combination:

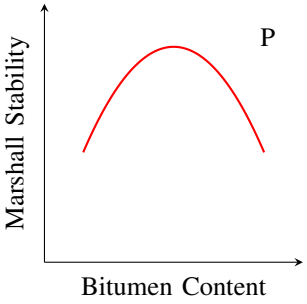
a) Group I:
i) P. Activated sludge process
ii) Q. Rising of sludge
iii) R. Conventional nitrification
iv) S. Biological nitrogen removal

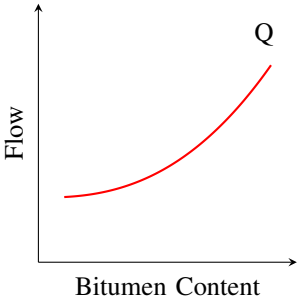
b) Group II:
i) 1. Nitrifiers and denitrifiers
ii) 2. Autotrophic bacteria
iii) 3. Heterotrophic bacteria
iv) 4. Denitrifiers

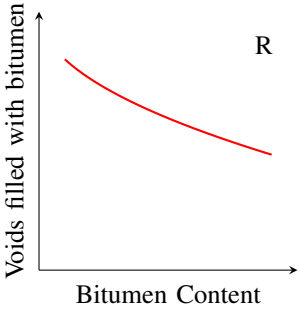
The correct answer is:

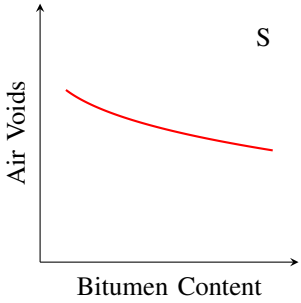
a) P-3, Q-4, R-2, S-1
b) P-2, Q-3, R-4, S-1
c) P-3, Q-2, R-4, S-1
d) P-1, Q-4, R-2, S-3

8) During a forensic investigation of pavement failure, an engineer reconstructed the graphs P, Q, R, and S, using partial and damaged old reports.









The theoretically plausible correct graphs according to the 'Marshall mixture design output' are:

a) P, Q, R b) P, Q, S c) Q, R, S d) R, S, P

9) In a one-lane one-way homogeneous traffic stream, the observed average headway is 3.0 s. The flow (expressed in vehicles/hr) in this traffic stream is _____

10) The minimum number of satellites needed for a GPS to determine its position precisely is:

a) (A) 2 b) (B) 3 c) (C) 4 d) (D) 5

11) The system that uses the Sun as a source of electromagnetic energy and records the naturally radiated and reflected energy from the object is called:
   a) Geographical Information System
   b) Global Positioning System
   c) Passive Remote Sensing
   d) Active Remote Sensing

12) The staff reading taken on a workshop floor using a level is 0.645 m. The inverted staff reading taken to the bottom of a beam is 2.960 m. The reduced level of the floor is 40.500 m. The reduced level (expressed in m) of the bottom of the beam is:

a) 44.105 b) 43.460 c) 42.815 d) 41.145

Q.26-Q.55 Carry two marks each

13) The probability density function of a random variable X is given below:

$$f(x) = \begin{cases} 0.25 & 0 \le x \le 5 \\ 0 & \text{otherwise} \end{cases}$$

$P(X \le 4)$ is

a) $\frac{3}{4}$ b) $\frac{1}{2}$ c) $\frac{1}{4}$ d) $\frac{1}{8}$