CE : GATE 2014

ai24btech11014
Charitha Sri

I. SET-1

1) An isolated three-phase traffic signal is designed by Webster's method. The critical flow ratio for three phases are $0.20, 0.30$, and 0.25 respectively, and lost time per phase is 4 seconds. The optimum cycle length (in seconds) is _____.
2) A levelling is carried out to establish the Reduced Levels (RL) of point R with respect to the Bench Mark (BM) at P. The staff readings taken are given below.

Staff Station	BS	IS	FS	RL
P	1.655m			100.000m
Q	-0.950m		-1.500m	
R			0.750m	?

If RL of P is +100.000m, then RL (in m) of R is:

a) 103.355
b) 103.155
c) 101.455
d) 100.355

3) Group I lists tools/instruments, while Group II lists the corresponding surveying methods. Match the tool/instrument with the corresponding method of surveying.

Group I	Group II
P. Alidade	1. Chain surveying
Q. Arrow	2. Levelling
R. Bubble tube	3. Plain table surveying
S. Stadia hair	4. Theodolite surveying

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

II. SET-2

1) A fair (unbiased) coin was tossed four times in succession and resulted in the following outcomes: (i) Head, (ii) Head, (iii) Head, (iv) Head. The probability of obtaining a 'Tail' when the coin is tossed again is:

a) 0
b) $\frac{1}{2}$
c) $\frac{4}{5}$
d) $\frac{1}{5}$

2) The determinant of the matrix $\begin{pmatrix} 0 & 1 & 2 & 3 \\ 1 & 0 & 3 & 0 \\ 2 & 3 & 0 & 1 \\ 3 & 0 & 1 & 2 \end{pmatrix}$ is _____

3) $z = \frac{2-3i}{-5+i}$ can be expressed as

a) $-0.5 - 0.5i$
b) $-0.5 + 0.5i$
c) $0.5 - 0.5i$
d) $0.5 + 0.5i$

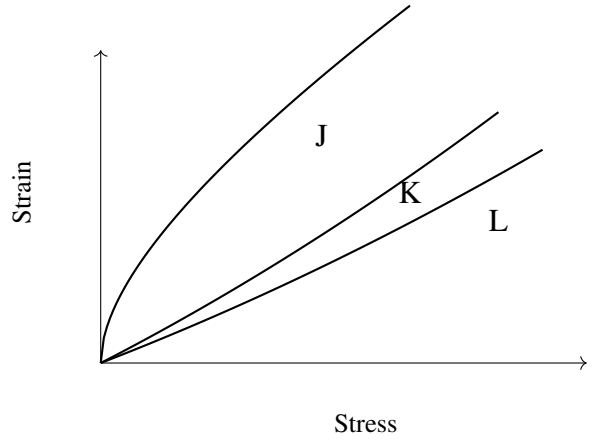
4) The integrating factor for the differential equation $\frac{dP}{dt} + k_2 P = k_1 L_0 e^{-k_1 t}$ is

a) $e^{-k_1 t}$ b) $e^{-k_2 t}$ c) $e^{k_1 t}$ d) $e^{k_2 t}$

5) If (x) is a continuous, real valued random variable defined over the interval $(-\infty, +\infty)$ and its occurence is defined by the density function given as: $f(x) = \frac{1}{\sqrt{2\pi}} b e^{\frac{-1}{2}\left(\frac{x-a}{b}\right)^2}$ where $'a'$ and $'b'$ are the statistical attributes of the random variable (x). The value of the integral $\int_{-\infty}^{a} \frac{1}{\sqrt{2\pi}} b e^{\frac{-1}{2}\left(\frac{x-a}{b}\right)^2} dx$ is

a) 1 b) 0.5 c) π d) $\frac{\pi}{2}$

6) Group I contains representative stress-strain curves as shown in the figure, while Group II gives the list of materials. Match the stress-strain curves with the corresponding materials.



Group I	Group II
P.Curve J	1.cement paste
Q. Curve K	Coarse aggregate
R. Curve L	3. Concrete

a) P-1; Q-3; R-2;
b) P-2; Q-3; R-1;
c) P-3; Q-1; R-2;
d) P-3; Q-2; R-1;

7) The first moment of area about the axis of bending for a beam cross-section is

a) moment of inertia
b) section modulus
c) shape factor
d) polar moment of inertia

8) Polar moment of inertia (I_P) , in cm^4, of a rectangular section having width, $b = 2cm$ and depth $d = 6cm$ is _____

9) The target mean strength f_{cm} for concrete mix design obtained from the charecteristic strength f_{ck} and standard deviation σ, as defined in IS:456-2000, is

a) $f_{ck} + 1.35\sigma$
b) $f_{ck} + 1.45\sigma$
c) $f_{ck} + 1.55\sigma$
d) $f_{ck} + 1.65\sigma$

10) The flexural tensile strength of M25 grade of concrete, in N/mm^2 as per IS:456-2000 is _____