GATE 2016 – A Brief Analysis
(Based on student test experiences in the stream of EC on 30th January, 2016 – (Forenoon Session)

Section wise analysis of the paper

Section Classification	1 Mark	2 Marks	Total No of Questions
Engineering Mathematics	3	4	7
Networks	3	3	6
Electronic Devices	4	4	8
Analog Circuits	2	3	5
Digital Circuits	2	3	5
Signals and Systems	5	3	8
Control Systems	3	3	6
Communication	1	2	3
Electromagnetics	2	5	7
Verbal Ability	3	2	5
Numerical Ability	2	3	5
	30	35	65

Questions from the Paper

General Aptitude

1. Despite the new medicine's ________ in treating diabetes, it is not ________ widely.
(A) effectiveness – prescribed (B) availability – used
(C) prescription – available (D) acceptance – proscribed

Key: (A)

2. If $q^{-a} = \frac{1}{r}$, $r^{-b} = \frac{1}{s}$ and $s^{-c} = \frac{1}{q}$, then the value of a.b.c is ________.

(A) $(rqs)^{-1}$ (B) 0 (C) 1 (D) r + q + s

Key: (C)

Exp: $q^{-a} = \frac{1}{r}, r^{-b} = \frac{1}{s}, s^{-c} = \frac{1}{q}$

$$q^a = r, r^b = s, s^c = q$$

$$r = q^a = \left(s^c\right)^a = s^{ac}$$

$$s = r^b = \left(s^{ac}\right)^b = s^{abc} \Rightarrow abc = 1$$

3. Leela is older than her cousin Pavithra, Pavithra's brother shiva is older than leela when Pavithra & Shiva are visting Leela, all the three like to play chess together, Pavithra wins more often than Leela does.
Which is true on the basis of above statement?
(A) When shiva plays chess with Leela and Pavithra, he often loses
(B) Leela is oldest of the three
(C) Shiva is better chess player than Pavithra
(D) Pavithra is the youngest of the three.

Key: (D)

4. Michel lives 10 km away from where I live, Ahmed lives 5 km and Susan lives 7 km away from where I live. Arun is farther away then Ahmed, but closer than Susan from where I live. From the information provided, what is one possible distance (in km) at which of I live from Arun
(A) 3.1 (B) 4.99 (C) 6.02 (D) 7.01

Key: (C)

5. Mount Everest is
(A) the highest peak in the world.
(B) highest peak in the world
(C) one of highest peak in the world
(D) one of the highest peak in the world.

Key: (A)

6. Policemen asked the victim of a theft, "What did you _______?"
(A) loose (B) lose (C) loss (D) louse

Key: (B)

Technical

1. The second moment of a poisson distributed random variable is 2. Then the first moment of the random variable is _________.

Key: 1

Exp: We know that if λ is parameter of poisson's distribution
Then
First moment $=\lambda$
Second moment $=\lambda^2+\lambda$
Given that $\lambda^2+\lambda=2$
$\Rightarrow \lambda^2+\lambda-2=0$
$\Rightarrow (\lambda+2)(\lambda-1)=0$
$\lambda=-2 \text{ or } 1 \qquad (\lambda \neq -2)$
$\therefore \lambda=1$
$\therefore$ First moment = 1

2. Following integral the counter C encloses the points $2\pi j$ and $-2\pi j$

$$\frac{1}{2\pi}\int_C \frac{\sin z}{(z-2\pi)^3}dz$$

The value of integral is _________.

Key: 1

Exp: Given integral $\frac{1}{2\pi}\oint \frac{\sin z}{(z-2\pi)^3}dz.$ Where C is the contour encloses $+2\pi j$ and $-2\pi j$.

Clearly singular point is 2π.

Case (i): If $z = 2\pi$ lies outside of contour C.

Then by Cauchy's theorem $\frac{1}{2\pi}\oint \frac{\sin z}{(z-2\pi)^3}dz = 0$ (The function is analytic)

Case (ii): If $z = 2\pi$ lies inside of contour C then by Cauchy's integral formula.

$$\frac{1}{2\pi}\oint_C \frac{\sin z}{(z-2\pi)^3}dz = \frac{1}{2\pi}\oint_c \frac{\sin z}{(z-2\pi)^{2+1}}dz = \frac{1}{2\pi}\times\frac{2\pi j}{2!}(-\sin z)\Big|_{z=2\pi} = \frac{1}{2\pi}\times\frac{2\pi i}{2!}\times 0 = 0$$

3. The integral $\frac{1}{2\pi}\iint_D (x+y+10)dxdy,$ where D denotes disc then the $x^2+y^2 \le 4$ evaluates to _________.

Key: 23.39

4. A sequence x(n) is specified as $\begin{bmatrix} x(n) \\ x(n-1) \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ for n > 2, the initial conditions are $x[0]=1, x[1]=1$ and $x(n)=0$ for n < 0 the value of x[12] is ________.

Key: 233

5. Let $M^4 = 1$ (where I is an Identity matrix) and $M \ne I,$ $M^2 \ne I,$ $M^3 \ne I$ then for any natural number K, and M^{-1} equals to ___________.

(A) M^{4k+1} (B) M^{4k+2} (C) M^{4K+3} (D) M^{4K}

Key: (C)

Exp: Given that $M^4 = I$

Verifying options $(M^{4k+3})\times M = I$

$M^{4k+4} = I$

$(M^4)^{k+1} = I$

$I^{k+1} = I$

6. Which an eigen function of the class of all conditions linear time invariant u(t) denotes the unit step function?

(A) $e^{j\omega_0 t}u(t)$ (B) $\cos\omega_0 t$ (C) $e^{j\omega_0 t}$ (D) $\sin\omega_0 t$

7. Which one of the following is the property for solutions of Laplace equation $\Delta^2 f = 0$

(A) The solution have neither maxima nor minima at anywhere except at boundary conditions.

(B) The solutions are not separable in their coordinates

(C) The solutions are not continuous

(D) The solutions not at any boundary conditions.

8. Consider the following MOSFET.

(A) As the channel length reduces, OFF-state current increases.

(B) As the channel length reduces, output resistance increases

(C) As the channel length reduces, threshold voltage remains constant.

(D) As the channel length reduces, ON-state current increases.

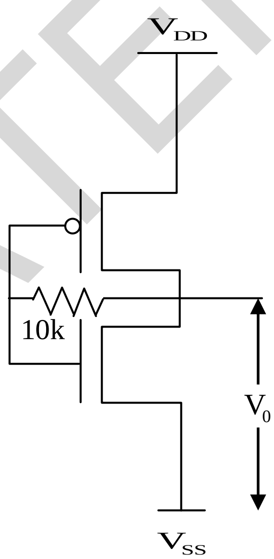
Key: (A)

Exp: $$I_D = \mu_n C_{0x}\frac{W}{L}\left[(V_{gs}-V_t)V_{DS} - \frac{V_{DS}^2}{2}\right]$$

$$I_D \propto \frac{1}{L}$$

As the channel length reduces their off state current increases.

9. The output voltage is

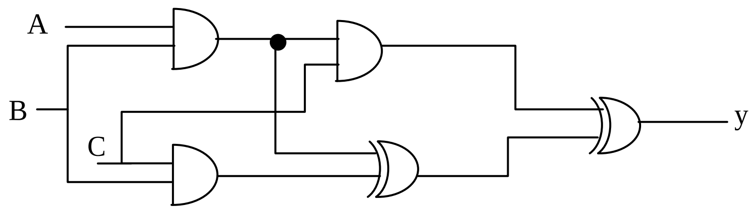


(A) 0 (B) $V_T(NMOS) + V_T(PMOS)/2$

(C) Switching the threshold voltage (D) V_{DD}

Key: (D)

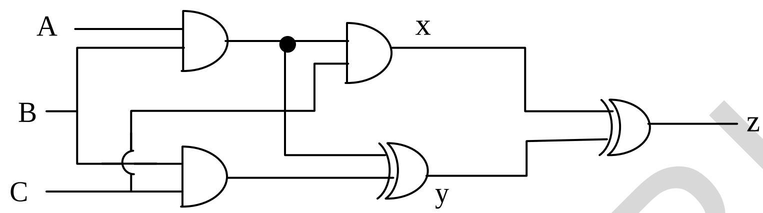
10. Find the output of the combinational circuit is



(A) A+B+C (B) A(B+C) (C) B(C+A) (D) C(A+B)

Key: (C)

Exp:



$$x = \sum m(7)$$
$$y = \sum m(3,6)$$
$$z = \sum m(3,6,7)$$
$$= \overline{A}BC + AB\overline{C} + ABC$$
$$= \overline{A}BC + AB$$
$$= B(\overline{A}C + A)$$
$$= B(A + C)$$