FIITJEE SAMPLE PAPER – 2018

(Big Bang Edge Test / Talent Recognition Exam)

***for* students presently in**

Class 11 (Paper 2)

Time: 3 Hours (1:45 pm – 4:45 pm) | **Code 1111** | ***Maximum Marks: 270***

Instructions:

Caution: Class, Paper, Code as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong Class, Paper or Code will give wrong results.

1. This Question paper consists of 3 sections. All questions will be multiple choice single correct out of four choices with marking scheme in table below:

Section – I, II & III (PCM)	Question no.	Marking Scheme for each question	
		correct answer	wrong answer
PHYSICS	1 to 2, 6, 31 to 32, 38, 61	**+3**	**–1**
	3 to 4, 7 to 9, 33 to 36, 39, 62	**+4**	**–1**
	5, 10, 37, 40, 63	**+5**	**–2**
CHEMISTRY	11 to 12, 16, 41 to 42, 48, 64	**+3**	**–1**
	13 to 14, 17 to 19, 43 to 46, 49, 65	**+4**	**–1**
	15, 20, 47, 50, 66	**+5**	**–2**
MATHEMATICS	21 to 22, 26, 51 to 52, 58, 67	**+3**	**–1**
	23 to 24, 27 to 29, 53 to 56, 59, 68	**+4**	**–1**
	25, 30, 57, 60, 69	**+5**	**–2**

2. Answers have to be marked on the OMR sheet. The Question Paper contains blank spaces for your rough work. No additional sheets will be provided for rough work.
3. Blank papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.
4. **Before attempting paper write your OMR Answer Sheet No., Registration Number, Name** and **Test Centre** in the space provided at the bottom of this sheet.
5. **See method of marking of bobbles of the back of cover page for question no. 31 to 69.**

Note: ***Please check this Question Paper contains all 69 questions in serial order. If not so, exchange for the correct Question Paper.***

OMR Answer Sheet No. : _____

Registration Number : _____

Name of the Candidate : _____

Test Centre : _____

For questions **31 to 60**

Numerical based questions single digit answer 0 to 9

Example 1:

If answer is 6.

Correct method:

⓪ ① ② ③ ④ ⑤ ❻ ⑦ ⑧ ⑨

Example 2:

If answer is 2.

Correct method:

⓪ ① ❷ ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

For questions **61 to 69**

Numerical answer type questions with answer XXXXX. XX

Correct bubbles to be darkened below the boxes for your answer.

If answer is 348.4 / 251.37 / 213

Correct Method :

		3	4	8	.	4	0
		2	5	1	.	3	7
		2	1	3	.	0	0

Wrong Method :

	3	4	8		.	4	
3	4	8			.		4
		3	4	8	.		4
	3		4	8	.	4	
	2		5	1	.	3	7
		2	1	3	.		

Section-I

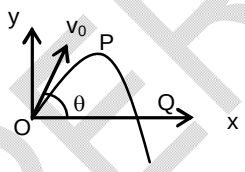
Science & Mathematics

Physics (Part – A)

Straight Objective Type

*Question numbers 1 to 2 are 2 passage based Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

A ball is projected with velocity v_0 at an angle θ with ground as shown in figure.



1. Average velocity for displacement $\vec{OQ}$ equals

(A) $v_0 \cos\theta\ \hat{i}$ (B) $\frac{v_0 \cos\theta}{2}\ \hat{i}$

(C) $\frac{v_0 \sin\theta}{2}\ \hat{i}$ (D) zero

2. The radius of curvature at Q equals

(A) $\frac{v_0^2}{g\cos\theta}$ (B) $\frac{v_0^2}{g\sin\theta}$

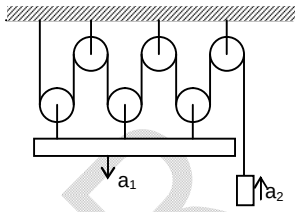
(C) $\frac{v_0^2}{g}$ (D) none of these

Space for Rough Work

Straight Objective Type

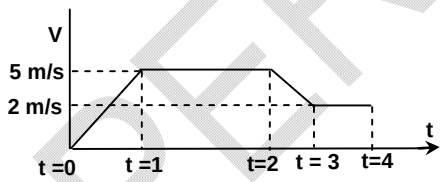
*Question numbers 3 to 5 are 3 multiple choice questions single correct. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

3. Strings and pulley are massless and frictionless. The relation in acceleration of the block as shown in the figure is



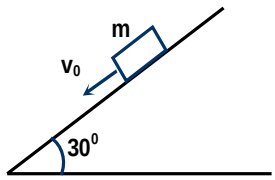
(A) $a_2 = 6a_1$ (B) $a_1 = 6a_2$
(C) $a_1 = 3a_2$ (D) $a_2 = 3a_1$

4. What will be distance travelled by a particle from t = 0 to t = 4 sec.



(A) 15.5 m
(B) 13 m
(C) 16 m
(D) none of these

5. A block of mass m is pushed down on a rough inclined plane (co-efficient of friction is 0.25) with a velocity v_0 as shown in the figure. Then, the block will



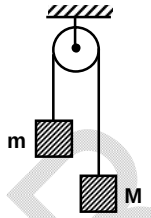
(A) decelerate and come to rest
(B) accelerate downward
(C) move downward with velocity v_0
(D) first accelerate then decelerate

Space for Rough Work

Straight Objective Type

*Question numbers 6 to 10 are 5 multiple choice questions multi correct. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or More** is correct.*

6. Two masses M and m (M > m) are joined by a light string passing over a smooth light pulley.



(A) The acceleration of each block is $\left(\frac{M-m}{M+m}\right)g$.

(B) The tension in the string is $\frac{2Mmg}{M+m}$.

(C) The centre of mass of the M plus m system moves down with an acceleration of $g\left(\frac{M-m}{M+m}\right)^2$.

(D) The tension in the string by which the pulley is attached to the roof is (M + m)g.

7. If $\vec{A}\times\vec{B}=\vec{C}$, $\vec{B}\times\vec{C}=\vec{A}$ and $\vec{C}\times\vec{A}=\vec{B}$ then

(A) $\vec{A}, \vec{B}, \vec{C}$ are coplanar

(B) $\vec{A}+\vec{B}+\vec{C}$ cannot be equal to zero

(C) angle between $\vec{A}$ and $\vec{B}$ may be less than 90°

(D) $\vec{A}, \vec{B}, \vec{C}$ are orthogonal to each other

8. A ball hits the floor and rebounds after an inelastic collision. In this case,

(A) the momentum of the ball just after the collision is the same as that just before the collision.

(B) the mechanical energy of the ball remains the same in the collision.

(C) the total momentum of the ball and the earth is conserved.

(D) the total energy of the ball and the earth is conserved

9. A projectile is thrown from the ground with a velocity $\vec{v}_0=3\hat{i}+4\hat{j}$ in m/s where $\hat{i}$ and $\hat{j}$ are the unit vectors along the horizontal and vertical direction respectively, then

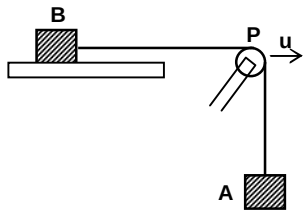
(A) magnitude of velocity at the highest point is 3 m/s

(B) magnitude of velocity at the highest point is 4 m/s

(C) magnitude of velocity when it collide on the ground surface is 3 m/s

(D) magnitude of velocity when it collide on the ground surface is 5 m/s

10. In the figure, the pulley P moves to the right with a constant speed u. The downward speed of A is v_A, and the speed of B to the right is v_B.



(A) $v_B = v_A$

(B) $v_B = u + v_A$

(C) $v_B + u = v_A$

(D) The two block have acceleration of the same magnitude.

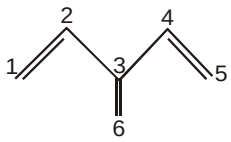
Space for Rough Work

Chemistry (Part – B)

Straight Objective Type

*Question numbers 11 to 12 are 2 passage based questions Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

Bond length is an important criterion in deciding the reactivity of organic entities. Bond length is affected by a number of factors like atomic size, electronegativity, bond order and resonance.

11. 

Taking into account all the resonating structures of the above molecule, find which bond has highest bond order :

(A) $C_1 – C_2$ (B) $C_2 – C_3$

(C) $C_3 – C_6$ (D) (a) and (c) are having same bond order.

12. How many types of Mn-O bond length(s) is/are there in $KMnO_4$ molecule.

(A) 1 (B) 2

(C) 3 (D) 4

Space for Rough Work

Straight Objective Type

*Question numbers 13 to 15 are 3 multiple choice questions single correct. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

13. A hydrogen like ion in excited state can emit 3 spectral lines and the minimum energy emitted in one of the transition is 7.5 eV. The species and the excited state ion belongs to, is
(A) H and 2^{nd} (B) He^{+} and 2^{nd}
(C) Li^{2+} and 2^{nd} (D) Can't be predicted

14. Which of the following molecular species is polar
(A) N_3^- (B) $NO_2^{\oplus}$
(C) CO_3^{-2} (D) O_3

15. What is the percentage of free SO_3 in an oleums sample ($H_2S_2O_7$) that is labeled ''109% H_2SO_4"?
(A) 20% (B) 30%
(C) 40% (D) 60%

Space for Rough Work

Straight Objective Type

*Question numbers 16 to 20 are 5 multiple choice questions multi correct. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or More** is correct.*

16. Which of the following represent redox reactions?
(A) $Cr_2O_7^{2-} + 2OH^- \rightarrow 2CrO_4^{2-} + H_2O$
(B) $SO_3^{2-} + H_2O + I_2 \rightarrow SO_4^{2-} + 2I^- + 2H^+$
(C) $2Ca(OH)_2 + 2Cl_2 \rightarrow Ca(OCl)_2 + CaCl_2 + 2H_2O$
(D) $PCl_5 \rightarrow PCl_3 + Cl_2$

17. Which of the following species have a bond order of 3?
(A) CO (B) CN^-
(C) NO^+ (D) O_2^+

18. Isotone (s) of $^{76}_{32}Ge$ is (are)
(A) $^{78}_{34}Se$ (B) $^{77}_{33}As$
(C) $^{77}_{34}Se$ (D) $^{77}_{32}Ge$

19. Select the correct relation on the basis of Bohr's theory
(A) velocity of electron $\propto \frac{1}{n}$ (B) frequency of revolution $\propto \frac{1}{n^3}$
(C) radius of orbit $\propto n^2z$ (D) force on electron $\propto \frac{1}{n^2}$

20. The fluoride, whose dipole moment is equal to zero is :
(A) XeF_4 (B) CF_4
(C) SF_4 (D) PF_5

Space for Rough Work

Mathematics (Part – C)

Straight Objective Type

*Question numbers 21 to 22 are 2 passage based questions Multiple Choice Questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

Read the following passage and answer the questions that follow

ABC is a triangle, the incircle touches the sides BC, CA and AB at D, E and F respectively. BD, CE and AF are consecutive natural numbers. I is the incentre of the triangles. The radius of the incircle is 4 units.

21. Sides of the triangle ABC are
(A) 11, 12, 13
(B) 12, 13, 14
(C) 13, 14, 15
(D) 14, 15, 16

22. Angles of the triangle DEF are
(A) $\pi - 2A, \pi - 2B, \pi - 2C$
(B) $\pi - A, \pi - B, \pi - C$
(C) $\frac{A}{2}, \frac{B}{2}, \frac{C}{2}$
(D) $\frac{\pi - A}{2}, \frac{\pi - B}{2}, \frac{\pi - C}{2}$

Space for Rough Work

Straight Objective Type

*Question numbers 23 to 25 are 3 multiple choice questions single correct. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

23. The range of the function $f(x) = \frac{x}{|x|}$ is

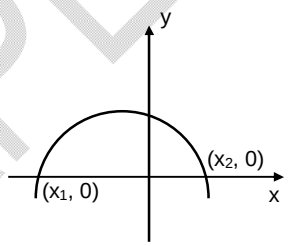
(A) $R - \{0\}$ (B) $R - \{-1, 1\}$
(C) $\{-1, 1\}$ (D) none of these

24. If $\frac{1}{x-2} \geq \frac{1}{3}$; then x belongs to

(A) $(-\infty, 5]$ (B) $[2, 5]$
(C) $(2, 5]$ (D) none of these

25. The diagram shows the graph of $y = ax^2 + bx + c$, then

(A) $a > 0$ (B) $b > 0$
(C) $c > 0$ (D) $b^2 - 4ac = 0$



Space for Rough Work

Straight Objective Type

*Question numbers 26 to 30 are 5 multiple choice questions multi correct. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or More** is correct.*

26. If n ((C – A) ∩ (C – B)) = 30, n (C) = 40, n (A ∩ C) = 5, n (B ∩ C) = 6, then
(A) n (C – B) = 34 (B) n (C – A) = 35
(C) n (A ∩ B ∩ C) = 1 (D) none of these

27. If $5^{\log_5\left(x^2-9x+24\right)} \geq x-1$, then
(A) x ∈ R (B) x ∈ (0, ∞)
(C) x ∈ (-∞, 0) (D) none of these

28. If $\frac{\log_2\left(4x^2-x-1\right)}{\log_2\left(x^2+1\right)} > 1$, then *x* may be
(A) $\left(-\infty, -\frac{2}{3}\right)$ (B) $(1, \infty)$
(C) $\left(-\frac{2}{3}, 0\right)$ (D) none of these

29. If a, a^2+2, a^3+10 be three consecutive terms of G.P., then the fourth term is
(A) 0 (B) 6
(C) $\frac{729}{16}$ (D) 54

30. If $a^2 + b^2 – c^2 – 2ab = 0$, then the family of straight lines ax + by +c = 0 is concurrent at the points
(A) (-1, 1) (B) (1, -1)
(C) (1, 1) (D) (-1, -1)

Space for Rough Work

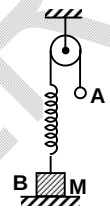
Section-II Physics, Chemistry & Mathematics

Physics (Part – A)

Numerical Based Questions

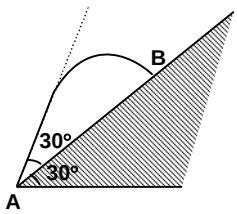
Question numbers 31 to 40 are 10 Physics contains 3 numerical based questions single digit answer 0 to 9.

31. In the figure, the ball A is released from rest when the spring is at its natural (unstretched) length. For the block B of mass 8 kg to leave contact with the ground at some stage, find the minimum mass of A (in kg).



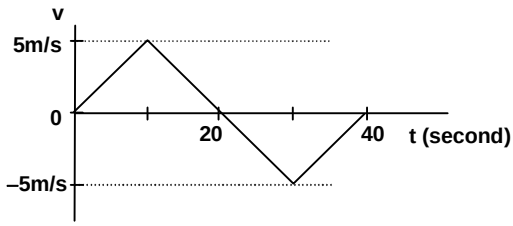
32. A particle has an initial velocity of $3\hat{i} + 4\hat{j}$ and an acceleration of $0.4\hat{i} + 0.3\hat{j}$. Its speed after 10 seconds is $k\sqrt{2}$. Find the value of k.

33. The surface of a hill is nearly plane with 30° slope as shown in the figure. From point A at the base, a shell is fired using a gun, with an initial velocity 30 m/s, in the direction making 30° angle with incline, the distance AB at which the shell strikes the hill is K × 10 m. Then find the value of K.



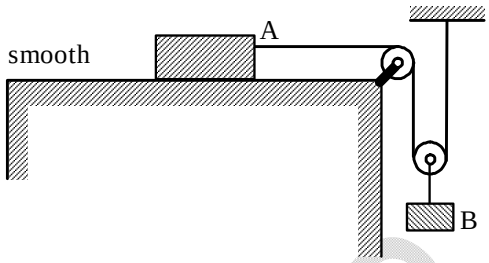
34. A particle of mass m is projected at angle θ with the horizontal. The speed of a particle, when it is at the greatest height is $(2/5)^{1/2}$ times its speed when it is at half of its greatest height. If its angle of projection is 12 μ. Find the value of μ in degree.

35. From the velocity-time plot shown in the figure, find the average velocity during this period.



Space for Rough Work

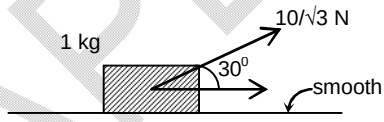
36. Find the acceleration of blocks A in m/s^2. Contact surface are smooth. Mass of each block A and B is 5 kg. (Assume pulleys to be light and frictionless and string to be light and inextensible)



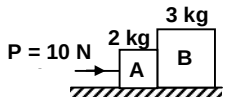
37. A body of mass 2 kg is projected vertically upwards with a speed of 3 m/s. Then, find the maximum gravitational potential energy of the body (in Joule).

38. A block of mass 2 kg is resting on a frictionless plane. It is struck by a jet releasing water at 1 kgs^{-1} and at a speed 10 ms^{-1}. Find initial acceleration (in m/sec^2) of the block.

39. What is the acceleration (in m/sec^2) of 1 kg block in the situation as shown in the figure



40. Block A and B have masses of 2 kg and 3 kg respectively. The ground is smooth. P is an external force of 10 N. Find the force exerted by B on A in Newton.



Space for Rough Work

Chemistry (Part – B)

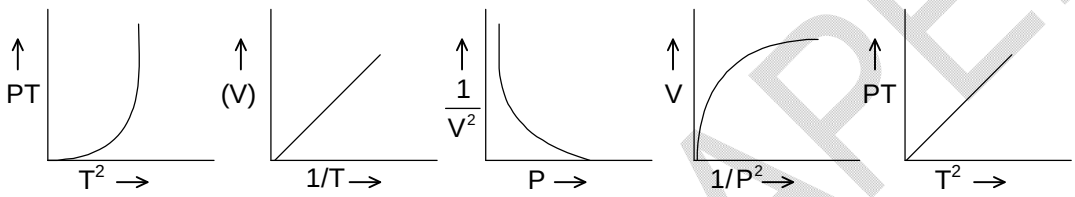
Numerical Based Questions

Question numbers 41 to 50 are 5 numerical based questions single digit answer 0 to 9.

41. Of the following species how many have a bond order > 2?
O_2^{2-}, O_2^-, O_2, O_2^+, CO

42. Among XeO_4, SO_3, $\ddot{N}Me_3$, NH_2OH, NH_4Cl, SO_2 and PCl_4^+, number of sp^3 hybridized compound are

43. 8 g of O_2 has the same number of molecules as in x g of CO. What is the value of x?

44. 

Sum of position numbers of correct graphs is

45. Number of atoms in a molecule of sulphur vapour is

46. Number of moles of electrons present in 11.2 L of NH_3 at STP will be

47. An hydrogen like ion has the wavelength difference between the first lines of Balmer and Lyman series equal to 59.3 nm (R_H = 109678 cm^{-1})? Write its atomic number.

48. Calculate total number of radial nodes in 3d sub-shell.

49. What will be the ratio of number of lone pairs present in I_3^- to XeF_2?

50. KIO_3 reacts with KI and both produce I_2. The n factor of KIO_3 is:

Space for Rough Work

Mathematics (Part – C)

Numerical Based Questions

Question numbers 51 to 60 are 10 numerical based questions single digit answer 0 to 9.

51. The number of real roots of the equation $2^{2x^2-7x+5} = 1$ is equal to ____

52. The value of $\lim_{x\to 0} \frac{\sin 2x}{x}$ is equal to _____

53. The number of lines that can be drawn from the point (2, 3), so that its distance from (-1, 6) is equal to 6, is _____

54. The value of $\frac{\tan 70^0 - \tan 20^0}{\tan 50^0}$ is equal to _____

55. The image of the point (3, –8) in the line x+ y = 0 is (α, β) then $\alpha + \beta$ is equal to _____

56. If $(a^2 - 1)x^2 + (a - 1)x + a^2 - 4a + 3 = 0$ be an identity in x. Then value of a is equal to ____

57. If $\tan^2 \theta = 2\tan^2 \phi + 1$, then $\cos 2\theta + \sin^2 \phi$ is equal to _____

58. The number of integral values of x for which $x^2 - 5x + 6 \leq 0$ and $x^2 - 2x > 0$ is equal to _____

59. If the product of the roots of the equation $x^2 - 3kx + 2e^{2\log_e k} - 1 = 0$ is 7, then k is equal to _____

60. The value of expression $\sqrt{3}$ cosec 20^0 –sec 20^0 is equal to _____

Space for Rough Work

Section-III Physics, Chemistry & Mathematics

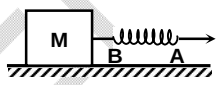
Physics (Part – A)

Numerical Answer Type

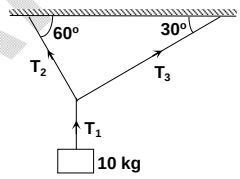
*Question numbers 61 to 63 are 3 numerical answer type questions with answer **XXXXX.XX.***

61. A car moving with constant acceleration covers a distance of 24 m in first 2 seconds and 51 m in the next 3 seconds. The velocity of the car after next 5 seconds will be:

62. One end (say B) of a massless spring having force constant k = 4 N/m is attached to a block lying on a smooth surface while the other end A is pulled by an external force. At some instant the velocities of ends A and B of the spring are v_A = 10 m/s and v_B = 5 m/s respectively. If the energy of the spring is increasing at the rate of P = 10 J/s, The instantaneous stretch in the spring will be:



63. A block of mass 10 kg is suspended by three strings as shown in the figure. The tension T_2 will be (g = 10 m/sec^2) :



Space for Rough Work

Chemistry (Part – B)

Numerical Answer Type

*Question numbers 64 to 66 are 3 numerical answer type questions with answer **XXXXX.XX.***

64. A mixture of gas contains N_2 and C_2H_2. 20 ml of this mixture is added to 70 ml of O_2 and combustion is allowed to take place over mercury. After cooling the volume of the gas is found to be 68.5 ml. when the resultant gas mixture is passed through KOH solution. The volume of the residual gas is 38.5 ml. The percentage composition of N_2 in the mixture will be:

65. If there are three possible values for spin quantum number, then possible number of elements in the 5^{th} period of periodic table would be:

66. What will be the volume of 0.05 M HCl required up to first end point with phenolphthalein if it is titrated with a 40 ml mixture of NaOH and Na_2CO_3, where strength of NaOH and Na_2CO_3 is 5 g l^{-1} and 13.25 g l^{-1} respectively:

Space for Rough Work

Mathematics (Part – C)

Numerical Answer Type

*Question numbers 67 to 69 are 3 numerical answer questions with answer **XXXXX.XX.***

67. If $x = \log_{0.1}0.001$ and $y = \log_9 81$ then $\frac{x+y}{2}$ is equal to _____

68. The sum of first 3 consecutive terms of a decreasing GP is 19 and their product is 216. If the sum of first 4 terms of GP is S then $\frac{3S}{4}$ is equal to _____.

69. If $\sin x + \cos x = \frac{\sqrt{7}}{2}$, $x \in \left[0, \frac{\pi}{4}\right]$, if the value of $\tan\frac{x}{2} = \frac{1}{\sqrt{a}+b}$, then the value of a + b is

Space for Rough Work

FIITJEE SAMPLE PAPER – 2018

(Big Bang Edge Test / Talent Recognition Exam)

for **students presently in**

Class 11

ANSWERS
Paper 2

1.	**A**	2.	**A**	3.	**A**	4.	**B**
5.	**B**	6.	**A, B, C**	7.	**B, D**	8.	**C, D**
9.	**A, D**	10.	**B, D**	11.	**A**	12.	**A**
13.	**D**	14.	**D**	15.	**C**	16.	**B, C, D**
17.	**A, B, C**	18.	**A, B**	19.	**A, B**	20.	**A, B, D**
21.	**C**	22.	**D**	23.	**C**	24.	**C**
25.	**C**	26.	**A, B, C**	27.	**A, B, C**	28.	**A, B**
29.	**C, D**	30.	**A, B**	31.	**4**	32.	**7**
33.	**6**	34.	**5**	35.	**0**	36.	**4**
37.	**9**	38.	**5**	39.	**5**	40.	**6**
41.	**2**	42.	**5**	43.	**7**	44.	**9**
45.	**2**	46.	**5**	47.	**3**	48.	**0**
49.	**1**	50.	**5**	51.	**2**	52.	**2**
53.	**0**	54.	**2**	55.	**5**	56.	**1**
57.	**0**	58.	**1**	59.	**2**	60.	**4**
61.	**00030.00**	62.	**00000.50**	63.	**Range 00086.50 to 00086.60**		
64.	**00025.00**	65.	**00027.00**	66.	**00200.00**	67.	**00002.50**
68.	**00016.25**	69.	**00009.00**				