1. Write a code to sort the elements firstly according to num of problems solved. If number of problems solved is equal then according to cgpa, if cgpa is equal then according to their registration number.

Input:

The number in the first line means number of students. Then each line of input has 3 numbers. The first number represents the registration number, the second number represents the number of solved problems and the third number represents the cgpa of the students.

4

1 200 3.99

4 400 3.77

2 1000 3.55

33 1000 3.62

Output:

33 1000 3.62

2 1000 3.55

4 400 3.77

1 200 3.99

2. Write a code to print the prime numbers within a given of 1 to n.

Input:

10

Output:

2

3

5

7

QUIZ: 1
Time: 7 minutes

- Write a code to find the medium between 3 numbers.
  Input:
  1 2 3
  Output
  2
- Write a code that takes as input three integers and determines whether a proper triangle can be formed by those three length of integers
  Input:
  3 4 5
  Output:
  Yes
  1 1 2
  Output:
  No

Institutional Quality Assurance Cell (IQAC)
Shahjalal University of Science and Technology
Sylhet-3114, Bangladesh

Sun ✓ Mon Tue Wed Thu Fri Sat

Date 23/11/2020

Assignment on Boolean Algebra (DM)

Submission Date: 25/11/20; Viva: 26/11; 10 AM

(5+5+5)

Q.1. Simplify following equation and construct a circuit for simplified expression.

$xyz + x\bar{y}\bar{z} + \bar{x}y\bar{z} + \bar{x}\bar{y}z$.

Q.2. ~~Simplify~~ Determine the minimum expression for the K map.

	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1	0	1	1
$\bar{A}B$	1	0	0	1
AB	0	0	0	0
$A\bar{B}$	1	0	1	1

K map

Q.3. Design a logic circuit corresponding to the truth table shown in figure 1.

A	B	C	X
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Figure 1

Assignment

1. A function f is defined as follows:

$$f(x)=\begin{cases} x & \text{for } x<1 \\ 2-x & \text{for } 1\le x\le 2 \\ -2+3x-x^2 & \text{for } x>2 \end{cases}$$

Show that f is continuous at $x=1$ and $x=2$ both; it is derivable at $x=2$ but not at $x=1$.

2. If $f(x)=\begin{cases} 3+2x & -3/2<x\le 0 \\ 3-2x & 0<x<\frac{3}{2} \\ -3-2x & x\ge\frac{3}{2} \end{cases}$

Discuss the continuity & differentiability of the functions at $x=0$ and $x=3/2$

3. Show that the function $f(x)=|x|+|x-1|$ is continuous at $x=1$ but not differentiable.

4. $f(x)=\begin{cases} 1 & x<0 \\ 1+\sin x & x\ge 0 \end{cases}$ is continuous but not differentiable at $x=0$

5. A function $f(x)$ is defined as follows.

$$f(x)=\begin{cases} 1+x & ; \ x\le 0 \\ x & ; \ 0<x<1 \\ 2-x & ; \ 1\le x\le 2 \\ 2x-x^2 & ; \ x>2 \end{cases}$$

Show that the function $f(x)$ is continuous at the points $x=1$ and $x=2$ but $f'(x)$ is not exist at that point.

6. If $y=e^{a\sin^{-1}x}$ then show that

$$(1-x^2)y_{n+2}-(2n+1)xy_{n+1}-(n^2+a^2)y_n=0$$

7. If $\sin^{-1}y=m\sin^{-1}x$ or $y=\sin(m\sin^{-1}x)$ then show that $(1-x^2)y_{n+2}-(2n+1)xy_{n+1}+(m^2-n^2)y_n=0$

8. If $y = \cot^{-1} x$ then show that,

$$(1+x^2) y_{n+2} + 2(n+1)x\, y_{n+1} + n(n+1) y_n = 0.$$

9. If $y = a\cos(\ln x) + b\sin(\ln x)$ then show that

$$x^2 y_{n+2} + (2n+1)x\, y_{n+1} + (n^2+1) y_n = 0$$

10. If $y = \cos\{\ln(1+x)\}$ then show that

$$(1+x)^2 y_{n+2} + (2n+1)(1+x)\, y_{n+1} + (n^2+1) y_n = 0.$$

11. Evaluate $\lim_{n\to\infty} \left[\frac{1^2}{1^3+n^3} + \frac{2^2}{2^3+n^3} + \frac{3^2}{3^3+n^3} + \cdots + \frac{n^2}{n^3+n^3} \right]$.

12. Evaluate $\lim_{n\to\infty} \left[\frac{1}{n} + \frac{\sqrt{n^2-1^2}}{n^2} + \cdots + \frac{\sqrt{n^2-(n-1)^2}}{n^2} \right]$

13. Evaluate $\lim_{n\to\infty} \left[\frac{n}{n^2+1^2} + \frac{n}{n^2+2^2} + \frac{n}{n^2+3^2} + \cdots + \frac{n}{n^2+n^2} \right]$

14. ~~lim~~ Evaluate $\lim_{n\to\infty} \left[\frac{1}{\sqrt{2n-1^2}} + \frac{1}{\sqrt{4n-2^2}} + \cdots + \frac{1}{n} \right]$

15. Evaluate. $\lim_{n\to\infty} \left[\frac{\sqrt{n}}{n^{3/2}} + \frac{\sqrt{n}}{(n+3)^{3/2}} + \frac{\sqrt{n}}{(n+6)^{3/2}} + \cdots + \frac{\sqrt{n}}{\{n+3(n-1)\}^{3/2}} \right]$

16. Evaluate. $\int \frac{dx}{3\sin x + 2\cos x + 5}$.

17. Evaluate $\int \frac{dx}{5+4\cos x}$

18. Evaluate $\int e^{2x} \sin^3 x \, dx$

19. Evaluate $\int \frac{x(\tan^{-1}x)^2}{(1+x^2)^{1/2}(1+x^2)}$

20. Evaluate. $\int \frac{x\,dx}{(x+1)\sqrt{x^2+1}}$

21. State Rolle's theorem. Verify it for $f(x) = 2x^3 + x^2 - 4x - 2$.

Group 1 : 1, 6, 11, 16, 21

Group 2 : 2, 7, 12, 17, 21

Group 3 : 3, 8, 13, 18, 21

Group 4 : 4, 9, 14, 19, 21

Group 5 : 5, 10, 15, 20, 21

Submission Date : 13.12.2020.

Assignment -1
Department of Software Engineering
Course Title: Mechanics, Wave, Heat and Thermodynamics
Course No. PHY 103W
Marks: 20
Date of Submission: 10 December, 2020 (Before 6 pm)

1. A light flexible rope is wrapped several times around a solid cylinder of mass 50 kg and diameter 0.14m, which rotates without friction about a fixed horizontal axis. The free end of the rope is pulled with a constant force of magnitude 9.84N for distance of 2.5m. If the cylinder is initially at rest, find its final angular velocity and the final speed of the rope. (3)

2. Calculate the minimum initial speed must a projectile have at the earth's surface to escape from the earth. (2)

3. An observer on the railway platform observed that a train passed through the station at 90km/hr., the frequency of the whistle appeared to drop by 400 Hz. Find the frequency of the whistle (velocity of sound in air = 350 m/s). (4)

4. a. Define Fourier series of a function f(x). (2)

b. Find the difference between simple harmonic motion and damped harmonic motion. (3)

5. a. Show that the change in entropy in going from one equilibrium state to another is independent of the path. (3)

b. The mean free path of nitrogen molecules at 0.0°C and 1.0 atm is 0.80×10^{5}cm. At this temperature and pressure there are 2.7×10^{19} molecules/cm^3.What is the molecular diameter? (3)

Good Luck

Assignment -2
Department of Software Engineering
Course Title: Mechanics, Wave, Heat and Thermodynamics
Course No. PHY 103W
Marks: 20
Date of Submission: 13 December, 2020 (Before 3 pm)

1. 1. The motion of a particle is described by the equation $x = 20\ cm + 4(cm.s^{-2})\ t^2$

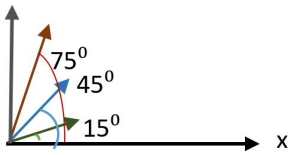
Find- a) the displacement of the particle in the time interval between $t_1=2s$ and $t_2=5s$

b) the average velocity in this time interval

c) the instantaneous velocity at time 2s. 6

2. Three balls are projected at angles of 15^0, $45^0$and 75^0 respectively with the horizontal with same velocity 10m/s.

Will the three Projectiles cover same horizontal distance?

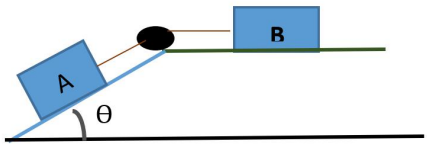


3

3. A projectile is launched at an angle of 22° with an initial velocity of 15 m/s up an incline plane that makes an angle of 10° with the horizontal. How far of the incline will the projectile go when it lands on the incline? 4

4. Calculate the minimum initial speed must a projectile have at the earth's surface to escape from the earth. 2

5. A block in figure bellow has m_A= 4kg and B has mass m_B=2kg. The kinetic co-efficient of friction between block and the horizontal plane is μ_K=0.5, The inclined plane is frictionless and at angle $\Theta=30^0$. The cord has negligible mass. Find- a) The tension in the cord, b)The magnitudes of the acceleration of the blocks. 5



Part: I

1. Find the equivalent resistance in the circuit of fig: 1

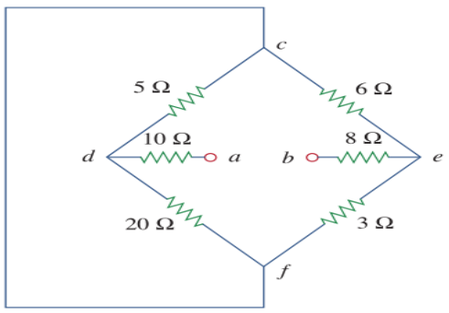


Figure: 1

2. Find the equivalent resistance at terminals a-b of the circuit in Fig. 2

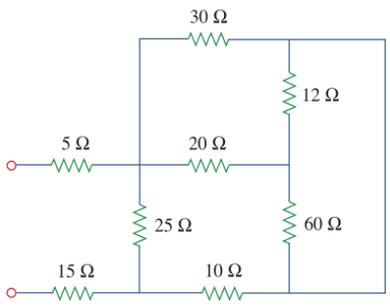


Figure: 2

3. Find I and V_{ab} in the circuit of Fig. 3

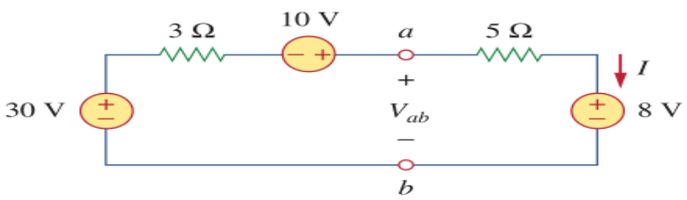


Figure: 3

4. Combine the series voltage sources into a single voltage source between points a and b.

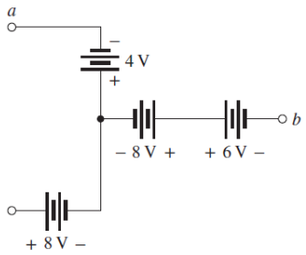


Figure: 4

5. Find the unknown quantities for the circuits in figures: 5 (a) and 5(b).

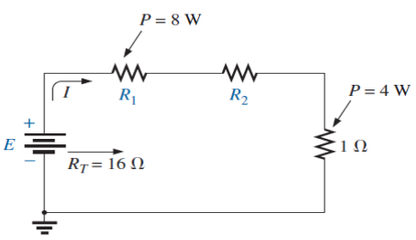


Figure: 5(a)

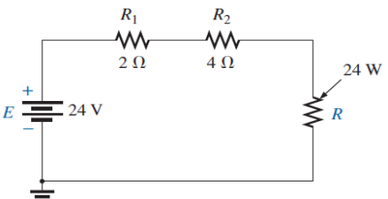


Figure: 5(b)

6. For a parallel circuit if the current ratio is 3:6:12. Find the ratio of resistance.

7. Find the equivalent resistance of the circuit as shown in figure: 7.

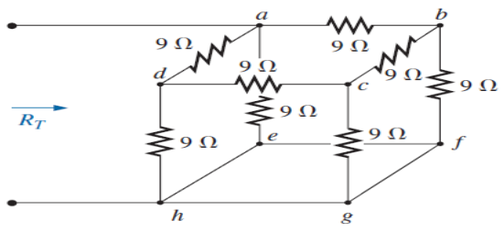


Figure: 7

8. Write the analytical expression for the waveforms of **Figure: 8** with the phase angle in radians.

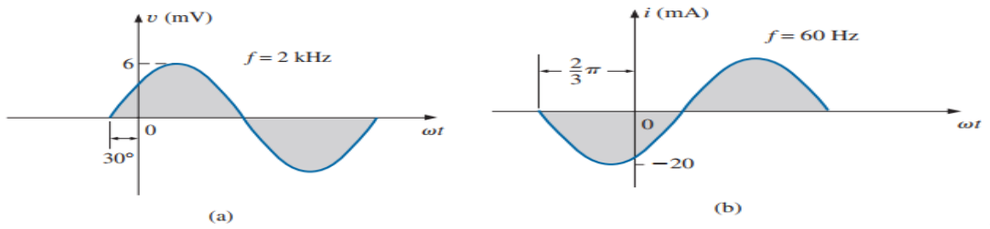


Figure:8

9. Find the phase relationship between the following waveforms:

a)

$v = 2\cos(\omega t - 30°)$

$i = 5\sin(\omega t + 60°)$

b)

$v = -4\cos(\omega t + 90°)$

$i = -2\sin(\omega t + 10°)$

10. Find the average value and rms value of the periodic waveform of **Fig. 10** over one full cycle.

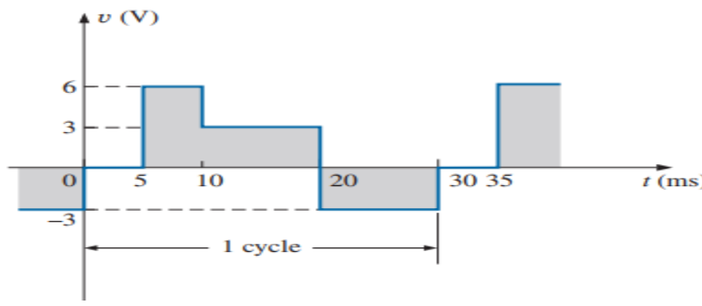


Figure: 10

9. Determine the average power delivered to networks having the input voltage and current of the following waveforms. Also determine the power factors, and indicate whether they are leading or lagging.

a)

$v = 100\sin(\omega t + 40°)$

$i = 20\sin(\omega t + 70°)$

b)

$v = 150\sin(\omega t - 70°)$

$i = 3\sin(\omega t - 50°)$

10. i) Obtain the simplified expressions in sum of products for the Boolean function **F** and implement the simplified function using basic gates.

F (w, x, y, z) = Σ (1, 3, 7, 11, 15)

F has the don't care conditions d (w, x, y, z) = Σ (0, 2, 5).

ii) Also express the original function F in products of maxterms.

11. Design a circuit that will turn on a LED only if 4 bit binary number B is less than a 4 bit binary number A.

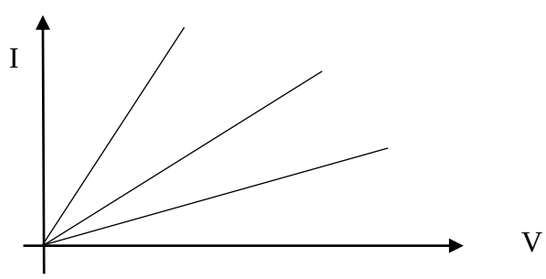
12. A combinational circuit has four inputs and one output. The output is equal to 1 when (i) all the inputs are equal to 1 or (ii) none of the inputs are equal to 1 or (iii) an odd number of inputs are equal to 1.

(a) Obtain the truth table.
(b) Find the simplified output function in sum of products.
(c) Find the simplified output function in product of sums.
(d) Draw the two logic diagrams.

13. Implement full adder with the help of (a) NAND gates (b) NOR gates.
14. Explain in detail about clippers and clampers with necessary figures and circuit diagrams.

Part -II

1. Explain in detail about clippers and clampers with necessary figures and circuit diagrams.
2. Explain how a sinusoidal signal delivers power to a load.
3. In the following plot which indicates higher resistance? Mathematically prove it.



4. Define ideal voltage source and ideal current source. Sketch the v-i characteristics for both.
5. How can an AND-OR network be converted to an all-NOR network?

TERM TEST, ENG101W
1-2, 2019-2020.

1) Argumentative Essay 10

2) True False & Fill in The Gaps 10X2=20

Argumentative Essay

"Parents should always choose the future career of their children"

Passage 1

The growth of bike-sharing schemes around the world

How Dutch engineer Luud Schimmelpennink helped to devise urban bike-sharing schemes

A. The original idea for an urban bike-sharing scheme dates back to a summer's day in Amsterdam in 1965. Provo, the organisation that came up with the idea, was a group of Dutch activists who wanted to change society. They believed the scheme, which was known as the Witte Fietsenplan, was an answer to the perceived threats of air pollution and consumerism. In the centre of Amsterdam, they painted a small number of used bikes white. They also distributed leaflets describing the dangers of cars and inviting people to use the white bikes. The bikes were then left unlocked at various locations around the city, to be used by anyone in need of transport.

B. Luud Schimmelpennink, a Dutch industrial engineer who still lives and cycles in Amsterdam, was heavily involved in the original scheme. He recalls how the scheme succeeded in attracting a great deal of attention — particularly when it came to publicising Provo's aims — but struggled to get off the ground. The police were opposed to Provo's initiatives and almost as soon as the white bikes were distributed around the city, they removed them. However, for Schimmelpennink and for bike-sharing schemes in general, this was just the beginning. 'The first Witte Fietsenplan was just a symbolic thing,' he says. 'We painted a few bikes white, that was all. Things got more serious when I became a member of the Amsterdam city council two years later.'

C. Schimmelpennink seized this opportunity to present a more elaborate Witte Fietsenplan to the city council. 'My idea was that the municipality of Amsterdam would distribute 10,000 white bikes over the city, for everyone to use,' he explains. 'I made serious calculations. It turned out that a white bicycle — per person, per kilometre — would cost the municipality only 10% of what it contributed to public transport per person per kilometre.' Nevertheless, the council unanimously rejected the plan. 'They said that the bicycle belongs to the past. They saw a glorious future for the car,' says Schimmelpennink. But he was not in the least discouraged.

D. Schimmelpennink never stopped believing in bike-sharing, and in the mid-90s, two Danes asked for his help to set up a system in Copenhagen. The result was the world's first large-scale bike-share programme. It worked on a deposit: ‘You dropped a coin in the bike and when you returned it, you got your money back.’ After setting up the Danish system, Schimmelpennink decided to try his luck again in the Netherlands — and this time he succeeded in arousing the interest of the Dutch Ministry of Transport. ‘Times had changed,’ he recalls. ‘People had become more environmentally conscious, and the Danish experiment had proved that bike-sharing was a real possibility.’ A new Witte Fietsenplan was launched in 1999 in Amsterdam. However, riding a white bike was no longer free; it cost one guilder per trip and payment was made with a chip card developed by the Dutch bank Postbank. Schimmelpennink designed conspicuous, sturdy white bikes

locked in special racks which could be opened with the chip card — the plan started with 250 bikes, distributed over five stations.

E. Theo Molenaar, who was a system designer for the project, worked alongside Schimmelpennink. 'I remember when we were testing the bike racks, he announced that he had already designed better ones. But of course, we had to go through with the ones we had.' The system, however, was prone to vandalism and theft. 'After every weekend there would always be a couple of bikes missing,' Molenaar says. 'I really have no idea what people did with them, because they could instantly be recognised as white bikes.' But the biggest blow came when Postbank decided to abolish the chip card, because it wasn't profitable. 'That chip card was pivotal to the system,' Molenaar says. 'To continue the project we would have needed to set up another system, but the business partner had lost interest.'

F. Schimmelpennink was disappointed, but — characteristically — not for long. In 2002 he got a call from the French advertising corporation JC Decaux, who wanted to set up his bike-sharing scheme in Vienna. 'That went really well. After Vienna, they set up a system in Lyon. Then in 2007, Paris followed. That was a decisive moment in the history of bike-sharing.' The huge and unexpected success of the Parisian bike-sharing programme, which now boasts more than 20,000 bicycles, inspired cities all over the world to set up their own schemes, all modelled on Schimmelpennink's. 'It's wonderful that this happened,' he says. 'But financially I didn't really benefit from it, because I never filed for a patent.'

G. In Amsterdam today, 38% of all trips are made by bike and, along with Copenhagen, it is regarded as one of the two most cycle-friendly capitals in the world — but the city never got another Witte Fietsenplan. Molenaar believes this may be because everybody in Amsterdam already has a bike. Schimmelpennink, however, cannot see that this changes Amsterdam's need for a bike-sharing scheme. 'People who travel on the underground don't carry their bikes around. But often they need additional transport to reach their final destination.' Although he thinks it is strange that a city like Amsterdam does not have a successful bike-sharing scheme, he is optimistic about the future. 'In the '60s we didn't stand a chance because people were prepared to give their lives to keep cars in the city. But that mentality has totally changed. Today everybody longs for cities that are not dominated by cars.'

1, *The paragraph above has seven paragraphs,* ***A—G.*** *Which paragraph contains the following information?*

Write the correct letter, ***A—G****, beside the numbers* ***(1-5)*** *on your answer sheet.*

NB: *You may use any letter more than once.* **Marks (01x05= 05)**

1. a description of how people misused a bike-sharing scheme
2. an explanation of why a proposed bike-sharing scheme was turned down
3. a reference to a person being unable to profit from their work
4. an explanation of the potential savings a bike-sharing scheme would bring
5. a reference to the problems a bike-sharing scheme was intended to solve

2. *Fill in the gaps to complete the summary below. Choose* ***ONE WORD ONLY*** *from the passage for each gap. Write only those 5 words on your answer sheet.* **Marks (01x05= 05)**

The first urban bike-sharing scheme

The first bike-sharing scheme was the idea of the Dutch group Provo. The people who belonged to this group were **a.**_____**.** They were concerned about damage to the environment and about **b.**_____**,** and believed that the bike-sharing scheme would draw attention to these issues. As well as painting some bikes **c.**_____, they handed out **d.**_____that condemned the use of cars. However, the scheme was not a great success: almost as quickly as Provo left the bikes around the city, the **e.**_____took them away. According to Schimmelpennink, the scheme was intended to be symbolic. The idea was to get people thinking about the issues.

PASSAGE 2

THE IMPORTANCE OF CHILDREN'S PLAY

Brick by brick, six-year-old Alice is building a magical kingdom. Imagining fairy-tale turrets and fire-breathing dragons, wicked witches and gallant heroes, she's creating an enchanting world. Although she isn't aware of it, this fantasy is helping her take her first steps towards her capacity for creativity and so it will have important repercussions in her adult life.

Minutes later, Alice has abandoned the kingdom in favor of playing schools with her younger brother. When she bosses him around as his 'teacher', she's practising how to regulate her emotions through pretence. Later on, when they tire of this and settle down with a board game, she's learning about the need to follow rules and take turns with a partner.

'Play in all its rich variety is one of the highest achievements of the human species,' says Dr David Whitebread from the Faculty of Education at the University of Cambridge, UK. 'It underpins how we develop as intellectual, problem-solving adults and is crucial to our success as a highly adaptable species.'

Recognising the importance of play is not new: over two millennia ago, the Greek philosopher Plato extolled its virtues as a means of developing skills for adult life, and ideas about play-based learning have been developing since the 19th century.

But we live in changing times, and Whitebread is mindful of a worldwide decline in play, pointing out that over half the people in the world now live in cities. 'The opportunities for free play, which I experienced almost every day of my childhood, are becoming increasingly scarce,' he says. Outdoor play is curtailed by perceptions of risk to do with traffic, as well as parents' increased wish to protect their children from being the victims of crime, and by the emphasis on 'earlier is better' which is leading to greater competition in academic learning and schools.

International bodies like the United Nations and the European Union have begun to develop policies concerned with children's right to play, and to consider implications for leisure facilities and educational programs. But what they often lack is the evidence to base policies on.

'The type of play we are interested in is child-initiated, spontaneous and unpredictable — but, as soon as you ask a five-year-old "to play", then you as the researcher have intervened,' explains Dr Sara Baker. 'And we want to know what the long-term impact of play is. It's a real challenge.'

Dr Jenny Gibson agrees, pointing out that although some of the steps in the puzzle of how and why play is important have been looked at, there is very little data on the impact it has on the child's later life.

Now, thanks to the university's new Centre for Research on Play in Education, Development and Learning (PEDAL), Whitebread, Baker, Gibson and a team of researchers hope to provide evidence on the role played by play in how a child develops.

'A strong possibility is that play supports the early development of children's self-control,' explains Baker. 'This is our ability to develop awareness of our own thinking processes — it influences how effectively we go about undertaking challenging activities.'

In a study carried out by Baker with toddlers and young pre-schoolers, she found that children with greater self-control solved problems more quickly when exploring an unfamiliar set-up requiring scientific reasoning. ‘This sort of evidence makes us think that giving children the chance to play will make them more successful problem-solvers in the long run.’

If playful experiences do facilitate this aspect of development, say the researchers, it could be extremely significant for educational practices, because the ability to self-regulate has been shown to be a key predictor of academic performance.

Gibson adds: 'Playful behavior is also an important indicator of healthy social and emotional development. In my previous research, I investigated how observing children at play can give us important clues about their well-being and can even be useful in the diagnosis of neurodevelopmental disorders like autism.'

Whitebread's recent research has involved developing a play-based approach to supporting children's writing. 'Many primary school children find writing difficult, but we showed in a previous study that a playful stimulus was far more effective than an instructional one.' Children wrote longer and better-structured stories when they first played with dolls representing characters in the story. In the latest study, children first created their story with Lego*, with similar results. 'Many teachers commented that they had always previously had children saying they didn't know what to write about. With the Lego building, however, not a single child said this through the whole year of the project.'

Whitebread, who directs PEDAL, trained as a primary school teacher in the early 1970s, when, as he describes, 'the teaching of young children was largely a quiet backwater, untroubled by any serious intellectual debate or controversy.' Now, the landscape is very different, with hotly debated topics such as school starting age.

‘Somehow the importance of play has been lost in recent decades. It's regarded as something trivial, or even as something negative that contrasts with "work". Let's not lose sight of its benefits, and the fundamental contributions it makes to human achievements in the arts, sciences and technology. Let's make sure children have a rich diet of play experiences.’

* Lego: colored plastic building blocks and other pieces that can be joined together

1. *Complete the notes below. Choose **ONE WORD ONLY** from the passage for each answer. Write only the words on your answer sheet.* **Marks (01x05= 05)**

Children's play

Uses of children's play

- building a 'magical kingdom' may help develop **a)**_____
- board games involve **b)**_____ and turn-taking

Recent changes affecting children's play

- Population of **c)**_____ have grown

International policies on children's play

- it is difficult to find **d)**_____ to support new policies
- research needs to study the impact of play on the rest of the child's **e)**_____

2. *Decide whether the following statements agree with the information given in the passage above. Write True/False/Not Given beside the numbers (1-5) on your answer sheet.* **Marks (01x05= 05)**

TRUE *- if the statement agrees with the information*
FALSE- *if the statement contradicts the information*
NOT GIVEN- *if there is no information on this*

1) Children with good self-control are known to be likely to do well at school later on.

2) The way a child plays may provide information about possible medical problems.

3) Playing with dolls was found to benefit girls' writing more than boys' writing.

4) Children had problems thinking up ideas when they first created the story with Lego.

5) People nowadays regard children's play as less significant than they did in the past.