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B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2021

First Semester

Add-on-Major

PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES — I

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answers :

1. CV Raman won Nobel prize in ————

(a) 1920 (b) 1930

(c) 1940 (d) 1950

2. The vibrational movement of atoms in the solid state is ————

(a) Crystal dynamics

(b) Diffraction

(c) Ultrasonic

(d) Hypersonic frequency

3. ———— is a branch of science that deals with sounds.

(a) Acoustics (b) Barometer

(c) Rheostat (d) Optics

4. Which among the following do you consider as the most effective reading method to comprehend a text?

(a) Skimming (b) Scanning

(c) Intensive (d) Extensive

5. ———— is an apparatus containing a movable mirror, used to reflect sunlight in a fixed direction.

(a) Refracting telescope

(b) Photo detector

(c) Photons

(d) Heliostat

6. I am an extremely thin film of soapy water. Who am I?

(a) Soap bubble (b) Foam

(c) Snow (d) Dish washer

7. When is Pi Day celebrated around the world?

(a) 14 Feb (b) 14 March

(c) 14 April (d) 15 March

8. Insulation material used to retain the heat of an object

(a) Iron (b) Bronze

(c) Insulation (d) Rubber

9. ———— is a colourless, odourless and non-toxic gas.

(a) Neon (b) Nitrogen

(c) Helium (d) Methane

10. ———— is the scientific study of the large scale properties of the universe as a whole.

(a) Hubble's law (b) Boyle's law

(c) Cosmology (d) Big bang thoery

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b)

Answer should not exceed 250 words.

11. (a) Read the passage and answer the questions.

The Internet of Things (IoT) refers to the vast world of interconnected devices with embedded sensors which are capable of providing data, and in some cases, being controlled, across the Internet. Common examples include many home automation devices, like smart thermostats and remotely controllable lighting fixtures, but there are countless others, from traffic sensors to water quality meters to smart electric grid components to tracking manufactured goods and vehicle fleets worldwide. Because of the rapid growth in the IoT space, there are a number of competing standards, tools, projects, policies, frameworks, and organizations hoping to define how connected devices communicate in the modern era.

What are some uses for IoT devices? How you might make use of IoT connected devices depends a bit on whether you"re more interested in collecting data or automating actions, and at what scale you are utilizing them.

• Indoor and outdoor lighting and electrical outlets which can be controlled by sensors, timers, and remote applications. • Cameras, motion sensors, automatic locks, and other access control devices which can be integrated into advanced security and monitoring systems. • Water leak sensors, smoke alarms, carbon monoxide sensors, and other devices designed to protect people and property from accidental harm. • Electric car chargers, battery banks, and other devices which can intelligently charge at off-peak hours to save money and reduce peak energy demands. For a government, company, or institution, IoT devices are a little different, and generally focus more on collecting data which can be processed and visualized, often in real-time. Some examples include. • Utility companies are able to more accurately forecast energy and water demands, reducing waste. • Advanced environmental sensors, include water, noise, and air quality monitors, can help understand pollution sources and effects before they negatively impact ecosystem and human health. • Agencies charged with public safety can develop more advanced early warning systems for natural disasters like earthquakes and floods, and have better data with which to provide vital services like fighting fires and providing humanitarian relief. Getting started with creating your own

devices and software for the Internet of Things is surprisingly easy. There are numerous hardware platforms targeted to beginners and hobbyists alike which have large communities behind them, including many which are partially or fully open hardware. Security and privacy are major concerns while using IoT which are currently being addressed by various industries and governments all over the world.

(i) What is the Internet of things?

(ii) List some applications of IoT.

(iii) How can governments make use of IoT?

(iv) What are the two major concerns while using IoT?

(v) What would you want to use IoT to make your daily life more comfortable in some way?

Or

(b) Fill in the blanks with suitable words from the choices given in the bracket.

(Prism, flatter, radiation, light, interactions)

Spectroscopy – is the study of the ———— between ———— and electromagnetic ———— via electron spectroscopy, atomic spectroscopy. Historically, spectroscopy originated through the study of visible ———— dispersed according to its wavelength, by a ————.

12. (a) Read the following passage and draw a flow chart.

Process of making photocopies.

Static electricity enables a photocopier to produce almost instant copies of documents. At the heart of the machine is a metal drum which is given a negative charge at the beginning of the copying cycle. The optical system then projects an image of the document on the drum. The electric charge disappears where light strikes the metal surfaces, so only dark parts of the image remain charged.

Positively charged particles of toner powder are then applied to the drum. The charged parts of the drum attract the dark powder, which is then transferred to a piece of paper. A heater seals the powder to the paper, and a warm copy of the document emerges from the photocopier.

Or

(b) What is extended definition? List out the steps involved in extended definition.

13. (a) Unscramble the following words.

(i) Naeoelcepsc

(ii) Oarcmulule

(iii) Ecuryfqen

(iv) Nucsereclfeo

(v) Mmrocoichtnoa

(vi) Stenyinti

(vii) Rutpaere

(viii) Pcagpsrhoetr

(ix) Emurcyr

(x) Ottecpsedohtro.

Or

(b) Locate the ANTONYMS of the following words from the bracket.

(Certainty, Consistent, Creating, Enjoyment, Destructive)

(i) Displeasure

(ii) Unimaginative

(iii) Constructively

(iv) Inconstant

(v) Instability.

14. (a) Read the passage and match the following questions.

The "black" part of the black hole is the event horizon. If an object breaches the event horizon and approaches the singularity it will become "spaghettified" – stretched and pulled apart by the black hole's gravitational forces. Scientists think that in the middle of the black hole is a "singularity". It's at this point in the black hole discussion that classical physics principles can no longer be applied (it stops making sense in this context) and quantum mechanics takes over. The theory is that the singularity is an infinitely small point where gravity and density are also infinite. The black hole is packed with all the heavy elements from the star but in a much smaller space. Imagine the mass of a star 10 times the size of our sun compressed into something the size of a city.

Part A	Part B
1. The 'black' part of the black hole is	A. It will become spaghettified
2. If an object breaches the event horizon	B. The event horizon
3. In the middle of the black hole	C. In a much smaller pace
4. "Spaghettified"	D. Is a singularity

5. Black hole packed with all the heavy elements and pulled the black gravitational	E. Stretched apart by hole's forces

Or

(b) Read the passage and answer the questions given below.

Nicolas Tesla is the inventor of the wireless radio. However, Guglielmo Marconi did design a practical application for this invention. In 1901, he sent the first wireless message across the Atlantic Ocean. It was the Morse Code letter, S. This invention would soon compete with the undersea telegraph cables. In 1900, Reginald Fessenden developed an electrolytic detector which could be used for the transmission of voices. He thought Marconi's vision for wireless communication was too limited. Along with Lee de Forest, he formed other wireless companies. They looked for new ideas to compete with Marconi's wireless transmission of code only. Marconi used the "spark" technology. Fessenden thought that wave technology could be used to transmit voice and music. He wanted to develop wireless telephony. By 1900, he developed a rotary spark transmitter. It could carry a voice for one mile. When sending a voice signal, the audio signal is first placed onto the radio frequency wave and then removed at the

other end. Originally, the sound was not very clear. He thought a cleaner radio wave would make the voice clearer. He then developed a high-speed alternator instead of the rotary spark technology.

Fessenden partnered with a scientist from general electric company to create such an alternator. In December 1906, he could send voice and music several miles. DeForest also made some broadcasts of music and voice in 1907. He then developed a three-element vaccum tube called an audition. A new era for radio began. In 1909, because of wireless communication, 1500 passengers were saved from drowning when the Republic sank. Other ships in the area were notified and provided rescue help. However, when the Titanic struck an ice berg in 1912, the wireless system in use showed fetal flaws. Interruption occurred from other radios which blocked communication with ships which might have come to the rescue of the titanic. The Wireless Act of 1912 set standards for radio operations. During World War I, all non-governmental radio stations were shut down. The U.S. Navy took over radio. The Radio corporation of America was founded after the war by general electric company. It took over the Marconi wireless telegraph company. In 1920, Westinghouse

corporation of Pittsburgh started a radio station just for entertainment. The first station was KDKA. Hundreds of new stations followed, as well as government regulation and licensing. Since AM radio experienced a lot of atmospheric noise, FM (frequency modulation) radio began. Transistor radios exploded in the 1950's. They became the mobile device for everyone. By 1979, most radio listening was to FM. Satellite-digital radio came along in 2000-2001. Most radio stations today "stream" their programming on the internet. MP3 portable digital devices which store music now are competing with radio music.

(i) Which of the following was the first radio station in the United States?

(1) KDKA (2) KOBG

(3) KPAD (4) KPVC

(ii) Who is considered to be the inventor of wireless radio?

(1) Thomas Edison

(2) Guglielmo Marconi

(3) Nicolas Tesla

(4) Reginald Fessenden

(iii) Who discovered the principle of the vacuum tube?

(1) Guglielmo Marconi

(2) Thomas Edison

(3) Nicolas Tesla

(4) Reginald Fessenden

(iv) Which of the following radio companies was founded after WWI?

(1) American radio company

(2) Radio company of America

(3) United States radio company

(4) Radio corporation of America

(v) In which of the following cities did the first radio station begin?

(1) Boston

(2) New York

(3) Pittsburgh

(4) Cleveland

(vi) When is the world radio day celebrated?

(1) 14th March

(2) 13th February

(3) 20th March

(4) 13th March

15. (a) Critically reflect your ideas in the form of an essay the advantages and the disadvantages of 5G network technology.

Or

(b) Read the following passage and answer the questions given below.

It will be surprising to know that this theorem functions as the basic principle of one of the most advanced inventions in human history, the navigation system. Now many countries have their navigation systems. The GPS of the United States America, GLONASS of Russia, Galileo of the European Union, BeiDou of China, QZSS of Japan, and NavIC of India are the operational navigation systems in the world today. These navigation systems guide aircraft, ships and other vehicles accurately to reach their destination. In navigation, the Pythagorean theorem helps to calculate the distance between two points. The satellites orbiting the entire globe transmitting positioning and timing data all through the day. Navigation in three dimensions is the basic function of navigations systems used around the world. Navigation receivers in the aircraft, ships, and ground vehicles supply

data to control systems over radio signals. The GPS of the USA is the most famous navigation system used almost all over the world. It uses a constellation of earth-orbiting satellites to send and receive data. Any navigation system uses signals from three different satellites to calculate the distance by performing triangulation activity. Navigation systems help in precise positioning and movement of objects. An aircraft will use its altitude and its distance from destination to identify the right place to begin a descent to the airport. Navigation systems are used for military purposes in the past but now they are provided to all, hence we can use our smart phone to find out a destination or calculate distance.

(i) What is a navigation system?

(ii) What is the name of the navigation system developed by India?

(iii) How is the navigation system useful for an aircraft?

(iv) How does the Pythagorean theorem help in navigation?

(v) How does a navigation system work?

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Answer should not exceed 600 words.

16. (a) Read the passage and answer the questions given below.

Hydroxychloroquine is a less toxic derivative of chloroquine and was discovered in 1945 as part of the efforts to lessen the toxic effects of chloroquine. It was approved for use in the US in 1955, and since then has been used for the treatment of a wide variety of diseases including arthritis, Systemic Lupus Erythematosus (SLE) etc.

Hydroxychloroquine (HCQ), is a medication used to prevent and treat malaria. It is also used for the treatment of rheumatoid arthritis, lupus, and porphyria cutaneatarda. HCQ is being studied to prevent and treat coronavirus disease 2019 (COVID-19). High-quality evidence of benefit for such use is lacking, with concerns of potential harm from its side effects.

Hydroxychloroquine is on the World Health Organization's list of essential medicines, which has the most the safest and most effective medicines needed in a health system. In 2017, it was the 128th most commonly prescribed medication in the United States, with more than five million prescriptions. The

speculative use of hydroxychloroquine for COVID-19 threatens its availability for people with established symptoms.

The HCQ story begins in 1638 when the wife of the Viceroy of Peru, Countess Cinchona, acquired malaria while living in the New World. Rather than getting the "approved" therapy – blood-letting, she was treated by an Incan herbalist with the bark of a tree (eventually, named the countess-Cinchona Tree). Her response was dramatic; when the viceroy returned to Spain, he brought with him large supplies of the powder for general use, which at the time was controlled by the Church and was thus called "Jesuit's Powder". It took nearly two centuries for the active substance, Quinine, to be isolated from the bark (and was eventually to make a name for itself as a tonic to be added togin). Over the next century, quinine would become a common component in folk medicines and patent remedies for the treatment of malaria in the sourthern states of America, as well as for generic malaise. By the 1940s, quinine, or, rather its derivative chloroquine, was recognized for its anti-malarial properties and found use among troops fighting in the pacific during WW-II. However, it was noted that this compound had significant toxicities. In 1945, a modification of this compound via hydroxylation led to the development of HCQ,

which was found to be less toxic and remains in use, without change, to this day.

Hydroxychloroquine treats rheumatic disorders such as systemic lupus erythematosus, rheumatoid arthritis, and porphyria cutaneatarda, and certain infections such as Q fever and certain types of malaria. It is considered the first-line treatment for systemic lupuserythematosus. Certain types of malaria, resistant strains, and complicated cases require different or additional medication.

The medicine is widely used to treat primary Sjögren syndrome but does not appear to be effective. Hydroxychloroquine is widely used in the treatment of post – lymearthristis. It may have both an anti-spirochete activity and an anti-inflmmatory activity, similar to the treatment of rheumatoid arthritis.

The most common adverse effects of the medicine are nausea, stomach cramps, and diarrhoea. Other common adverse effects include itching and headache. The most serious adverse effects affect the eye, with dose-related retinopathy as a concern even after hydroxychloroquine use is discontinued. Serious reported neuropsychiatric adverse effects of hydroxychloroquine use include agitation, mania, difficulty in sleeping, hallucinations, psychosis, catatonia, paranoia,

depression, and suicidal thoughts. In rare situations, hydroxychloroquine has been implicated in case of serious skin reactions such as Stevens – Johnson syndrome, toxic epidermal necrolysis, and drug reaction with ecosinophilia and systemic symptoms. Reported blood abnormalities with its use include lymphopenia, eosinophilia, and atypical lymphocytosis. Children may be especially vulnerable to developing adverse effects from hydroxychloroquine.

Answer the following questions from the passage.

(i) List the various uses of hydroxychloroquine given in the passage.

(ii) Can hydroxychloroquine prevent the severity of Covid-19?

(iii) Rearrange the given words in the proper order.

  (i) prevent/treat/and/medication/to/ used/a/HCQ/is/Malaria

  (ii) had/toxicities/compound/significant /the

  (iii) additional/malaria/types/certain/of /requires/medication

  (iv) bark/took/it/centuries/two/the/ isolated/the for/from/bark/be/quinine

Or

(b) Comment on the rocket design and craftsmanship of Tipu Sultan, in comparison with the rocket designs that are being used in the present-day context.

17. (a) Write the extended definitions for the following words.

(i) Barometer

(ii) Flow chart

(iii) Gober gas plant

(iv) Microphone.

Or

(b) Read the following passage and answer the questions below.

Can talking on a mobile phone be hazardous to your health? It is difficult to know for sure. Some research suggests that heavy users of mobile phones are at a grater risk of developing cancerous brain tumors. However, many other studies suggest that there are no links between cancer and mobile phone use. The main problem with current research is that mobile phones have only been popular since the 1990s. As a result, it is impossible to study long-term exposure to mobile phones. This concerns many health professionals who point out that certain cancers can take over twenty years to develop. Another concern

about these studies is that many have been funded by the mobile phone industry or those who benefit from it.

Over five billion people now use mobile phones daily, and many talk for more than an hour a day. Mobile phone antennas are like microwave ovens. While both rely on electromagnetic radiation (EMR), the radio waves in mobile phones are lower in frequency. Microwave ovens have radio wave frequencies that are high enough to cook food, and they are also known to be dangerous to human tissues like those in the brain. The concern is the lower-frequency radio waves that mobile phones rely on may also be dangerous. It seems logical that holding a heat source near your brain for a long period is a potential health hazard.

Some researchers believe that other types of wireless technology may also be dangerous to human health, including cordless phones, wireless gaming consoles, and laptop or tablet computers with wireless connections. They suggest replacing all cordless and wireless devices with wired ones where possible. They also say that many cordless phones can emit dangerous levels of electromagnetic Radiation even when they are not in use. They even suggest keeping electronic devices such as desktop and tablet computers out of the

bedroom, or at least six feet from the head while we're sleeping.

A growing number of health professionals worldwide are recommending that mobile phone users err on the side of caution but this cannot be accepted, until more definitive studies can be conducted. They use the example of tocbacco to illustrate the potential risks. Many years ago, people smoked freely and were not concerned about the effects of cigarettes on their health. Today, people know that cigarettes cause lung cancer, though it is still unknown exactly how or why. Some doctors fear that the same thing will happen with mobile phones. IN May 2016, the UK's Independent newspaper reported on research by the US government's National Toxicology Program that showed a slight increase in brain tumors among rats exposed to the type of radio frequencies commonly emitted by mobile phones. This doesn't prove that mobile phones can cause brain tumors in humans, but it does show that it's possible. As a result, many experts now recommend texting or using headsets or speaker phones instead of holding a mobile phone to the ear.

(i) How does the usage of mobile phones affect our health?

(ii) In what way does a cordless phone harm our body?

(iii) What are the dangers caused by the microwave oven to humans?

(iv) Why should electronic gadgets be kept out of the bedroom while sleeping?

(v) What was the finding of the US government's national toxicology?

18. (a) Modern electronic devices such as mobile phones, TVs, tablets, computer monitors, laptops screens, etc., use a LED display to display their output. Discuss the uses of these devices.

Or

(b) Read the following except written by Ramanujan. Fill in the blanks in the letter with the words given below.

(University, enclosed, Inexperienced, investigation, convinced, excused, conventional, approximates, published, indicated)

Dear Sir,

I beg to introduce myself to you as a clerk in the Accounts Department of the Port Trust office at Madras on a salary of only £ 20 per annum. I am now about 23 years of age. I have had no ———— education but I have undergone the ordinary school course. After leaving school I have been employing the

spare time at my disposal to work at Mathematics. I have not trodden through the ———— regular course, which is followed in a University course, but I am striking out a new path of myself. I have made a special ———— of divergent series in general and the results I get are termed by the local mathematicians as "startling".

Very recently I came across a tract published by you styled orders of infinity in page 36 of which I find a statement that no definite expression has been as yet found for the number of prime numbers less than any given number. I have found an expression which very nearly ———— to the real result, the error being negligible. I would request you to go thought the ———— papers.

Being poor, if you are ———— that there is anything of value I would like to have my theorems ———— I have not given the actual investigations nor the expressions that I get but I have ———— the lines on which I proceed. Being ———— I would very highly value any advice you give me. Requesting to be ———— for the trouble I give you.

I remain, Dear Sir,

Yours truly,

S. Ramanujan.

19. (a) Write a paragraph detailing the similarities between biomass and biofuels.

Or

(b) Write eight sentences about the significance of Newton's theory in physics.

20. (a) Fill in the gaps with the following words.

(Finite, brane, proton, fusing galaxie, large, light, reionization, earth)

The beginning of our universe would have been nice and ————. The cyclic model posits that our universe consists of 1I dimensions, only four of which we can observe (three of space and one of time). Our four-dimensional part of the universe is called a ———— (short for membrane). Just after inflation, the universe was likely filled with hot, dense plasma. But by around I microsecond (10 to the minus 6 seconds) or so, it had cooled enough to allow the first ———— and neutrons to form, researchers, think. In the first three minutes after the big bang, these protons and neutrons began together, forming deuterium (also known as heavy hydrogen). Deuterium atoms then joined up with each other, forming helium 4. Over time, stars gravitated together to form

————————, leading to more and more ———————— structure in the universe. Planets coalesced around some newly forming stars, including our own sun. And 3.8 billion years ago, life took root on ————————. Once the universe's first stars ignited, the ———————— they unleashed packed enough punch to once again strip electrons from neutral atoms, a key chapter of the universe called ————————.

Or

(b) Read the passage and answer the questions given below.

In many places on our planet, we experience severe disasters like earthquakes, tsunamis, and cyclones resulting in loss of life, loss of wealth, and in some cases, the destruction of decades of progress made by countries and their valuable cultural heritage. India has earthquake problems periodically in certain regions. The U.S. Japan, Turkey, Iran, and many other countries also suffer due to earthquakes. Earthquakes and tsunamis are sub-terrain phenomena and predicting this from space observations would be a great challenge. Space scientists of multiple nations should work together to use satellite deep

penetration images to predict the earthquake or shock wave propagation. Other possibilities are a precise geodynamic measurement of strain accumulation by satellite to detect pre-slip, and electromagnetic phenomena prior to final rupture. The focus must be on earthquake forecasting with an adequate warning so that people can move to safer areas. Space technology can also be used for forecasting and modeling of volcanic eruptions, landslides, avalanches, flash floods, storm surges, hurricanes, and tornadoes.

(i) Fill in the blanks.

(1) Earthquakes and tsunamis are ———— phenomena.

(2) Space scientists should work ————.

(3) ———— is also used to predict hurricanes.

(ii) Give the synonym form the passage for the following words.

(1) Picture ————

(2) Predict ————

(3) Sufficient ————

(iii) Give the antonym from the passage for the following words.

(1) Single ——————

(2) Experience ——————

(3) Invaluable ——————

———————