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Department of Electronics and Communication Engineering

(Accredited by NBA)

"LEMON NEWSLETTER"

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Message from Head of the Department

I appreciatethe students who have participated and in National level symposiums and workshops which will uplift their career to further levels.

I wish students to strive hard for their success in upcoming exams and aim for the high grades in their semester.

I presume from the faculties of ECE department for their active participation in Faculty development programmes and workshops.

Dr.CHITRAVALAVAN

HOD/ECE

POSITIVENESS

- *Positive anything is better than negative nothing*
- *Live life to the fullest, and focus on the positive:*
- *Focus on the beauty of life, knowing that it's limited*
- *Once you replace negative thoughts with positive ones, you'll start having positive results*
- *The mind is everything. What you think you become*

Faculty Corner:

Wireless Sensor Network and Beyond

- ***Dr.C.Jayasri,AP /ECE***

Wireless Sensor Networks (WSNs) have evolved significantly and continue to play a crucial role in modern technology. Initially, WSNs were developed for environmental monitoring, industrial automation, and military applications, but today, they extend into a wide range of fields, including the Internet of Things (IoT), smart cities, healthcare, and even beyond Earth applications.

Evolution and Beyond

1. Traditional WSNs

Early WSNs were composed of low-power sensor nodes that collected and transmitted data wirelessly. These networks were used in:

- Environmental monitoring (e.g., weather conditions, pollution levels)
- Industrial automation (e.g., equipment monitoring, predictive maintenance)
- Healthcare (e.g., patient monitoring)
- Military and defense (e.g., battlefield surveillance)

2. Integration with IoT

With the rise of IoT, WSNs have become more advanced, integrating with cloud computing, big data analytics, and AI. IoT-enabled WSNs are used in:

- Smart homes (e.g., automated lighting, security systems)
- Smart agriculture (e.g., precision farming, irrigation control)
- Smart cities (e.g., intelligent traffic systems, air quality monitoring)

3. Edge Computing and AI-Driven WSNs

Recent advancements include AI-driven WSNs where edge computing reduces latency and enhances real-time decision-making. Examples include:

- AI-powered healthcare monitoring (e.g., wearables for early disease detection)
- Autonomous vehicle networks (e.g., V2V communication for self-driving cars)
- Industry 4.0 (e.g., AI-powered predictive maintenance)

Here is a futuristic visualization of Wireless Sensor Networks (WSNs) and their advancements. The image includes smart city sensor nodes, IoT devices, AI-driven analytics, space-based sensor networks with satellites,

underwater monitoring systems, and autonomous vehicles using sensor networks for navigation.

4. 5G and Beyond

The introduction of 5G and future 6G networks will enhance WSN capabilities with:

- Ultra-reliable low-latency communication (URLLC) for mission-critical applications
- Massive Machine-Type Communication (mMTC) for large-scale IoT deployments
- Higher data transfer speeds and reduced energy consumption

5. Space and Underwater WSNs

WSNs are expanding beyond Earth and deep into the ocean:

- **Space WSNs**: Used for planetary exploration, satellite networks, and deep-space communication
- **Underwater WSNs**: Deployed for marine life monitoring, ocean exploration, and underwater disaster prevention

6. Future Trends

- **Quantum-based WSNs**: Leveraging quantum computing for ultra-secure communications
- **Bio-inspired WSNs**: Mimicking biological systems for self-organizing and energy-efficient networks
- **Nano-WSNs**: Tiny nanosensors for biomedical and environmental applications

Student Corner :

Fiber Cutoff Wavelength Measurement

- E.Nikitharajam, III ECE

- **What is Cutoff Wavelength in Optical Fiber?**

The cutoff wavelength (λc) of an optical fiber is the shortest wavelength at which the fiber supports only the fundamental mode (single-mode operation). Below this wavelength, higher-order modes can propagate, making the fiber behave as a multimode fiber rather than a single-mode fiber (SMF).

- **Measurement Methods**

The cutoff wavelength is typically measured using one of the following techniques:

1. Bend Reference Technique (IEC 60793-1-44 Standard)
   - A test fiber is looped with a small bend radius to suppress higher-order modes.
   - Light is launched into the fiber at multiple wavelengths, and the transmitted power is measured.
   - The cutoff wavelength is determined by analyzing the loss characteristics.
2. Transmission Method (Direct Cutoff Measurement)
   - Light at different wavelengths is transmitted through a long fiber sample.
   - The output power is measured, and the cutoff wavelength is identified as the point where power stabilizes to a single-mode behavior.
3. Fiber Spool Measurement
   - A fiber spool of at least 2 meters in length is used.

- A broadband light source (e.g., LED, ASE source) and an Optical Spectrum Analyzer (OSA) measure the spectral response.
- The cutoff wavelength is determined by plotting transmission loss against wavelength.

Typical Cutoff Wavelength Values

- Standard single-mode fibers (SMF-28): 1250–1320 nm
- Dispersion-shifted fibers: below 1300 nm
- Specialty fibers: Can have tailored cutoff wavelengths

Factors Affecting Cutoff Wavelength

- Core diameter and Numerical Aperture (NA)
- Bending and stress on the fiber
- Fiber length used in the test
- Refractive index profile

Internet of Things (IoT) in the Electronics Industry

-Mohamed Fasil.S.B,III ECE

The **Internet of Things (IoT) in the Electronics Industry** has transformed the way devices interact, communicate, and operate. It enables smart connectivity, automation, and data-driven decision-making across various electronic applications. Here's how IoT is shaping the electronics industry:

1. Smart Consumer Electronics

- **Smartphones &Wearables:**IoT enhances connectivity in smartwatches, fitness trackers, and smartphones, enabling real-time health monitoring and seamless communication.
- **Smart Home Devices:**IoT-enabled devices like smart TVs, refrigerators, thermostats, and security cameras allow remote control and automation via mobile apps or voice assistants (e.g., Alexa, Google Assistant).
- **Connected Appliances:** Refrigerators, washing machines, and air conditioners use IoT for predictive maintenance and energy efficiency.

2. Industrial Electronics & Automation

- **Smart Manufacturing (Industry 4.0):**IoT powers predictive maintenance, real-time monitoring, and automated production lines, reducing downtime and increasing efficiency.
- **Industrial Sensors & Actuators:** Sensors collect data on temperature, pressure, and vibration, optimizing equipment performance.
- **Remote Monitoring:**IoT enables remote diagnostics and troubleshooting, minimizing manual intervention.

3. Automotive Electronics

- **Connected Cars:**IoT enhances vehicle safety, navigation, and diagnostics through smart infotainment, GPS, and telematics systems.
- **Autonomous Vehicles:**IoT integrates with AI to enable self-driving cars, vehicle-to-vehicle (V2V) communication, and accident prevention.
- **Fleet Management:**IoT-based tracking systems optimize logistics, fuel consumption, and vehicle health monitoring.

4. Healthcare Electronics

- **Wearable Health Devices:**Smartwatches and medical sensors track heart rate, oxygen levels, and ECG data, transmitting real-time health insights to doctors.

- **Remote Patient Monitoring:**IoT-based devices allow continuous monitoring of patients, improving healthcare accessibility.
- **Smart Medical Equipment:**IoT-enabled devices like insulin pumps and ventilators improve patient outcomes through automation and precision.

5. Smart Energy & Utilities

- **Smart Grids:**IoT helps manage electricity distribution, detect faults, and reduce power outages.
- **Smart Meters:**IoT-enabled electricity, gas, and water meters provide real-time usage data, enabling efficient billing and energy conservation.
- **Renewable Energy Management:**IoT optimizes solar panels and wind turbines by analyzing weather conditions and energy output.

6. Security & Surveillance Electronics

- **Smart Cameras & Alarms:**IoT-powered security systems offer remote monitoring, motion detection, and AI-driven alerts.
- **Access Control Systems:**IoT enables biometric authentication, RFID-based entry systems, and smart locks for enhanced security.

7. Supply Chain & Logistics

- **IoT in Warehousing:** Smart sensors track inventory, automate sorting, and prevent theft or damage.
- **Cold Chain Monitoring:**IoT monitors temperature-sensitive goods (e.g., pharmaceuticals, food) in transit.
- **RFID & GPS Tracking:** Real-time location tracking improves supply chain transparency and reduces delays.

Challenges in IoT Implementation

- **Cybersecurity Risks:**IoT devices are vulnerable to hacking, requiring robust encryption and security protocols.
- **Data Privacy Issues:** Large-scale data collection raises concerns about user privacy and compliance with regulations (e.g., GDPR).
- **Interoperability:** Lack of standardized communication protocols can hinder seamless device integration.
- **High Initial Costs:** Implementing IoT solutions requires investment in infrastructure, sensors, and cloud storage.

Future of IoT in the Electronics Industry

- **AI & Machine Learning Integration:** Smarter decision-making and predictive analytics will enhance IoT applications.
- **5G Connectivity:** Faster data transmission will enable real-time IoT applications like autonomous driving and smart cities.
- **Edge Computing:** Reducing reliance on cloud computing by processing data closer to the source for lower latency.
- **Sustainable Electronics:**IoT-driven energy management will help create eco-friendly, power-efficient devices.

IoT is revolutionizing the electronics industry by enhancing connectivity, efficiency, and automation across various sectors. As technology advances, IoT's impact will continue to grow, shaping a smarter and more interconnected world.

APTITUDE QUESTIONS

-Vishnu Prakash.S, IV ECE

1. Numerical Ability

Q1: A train running at 60 km/h crosses a pole in 9 seconds. What is the length of the train?

A:

- Speed = 60 km/h = (60 × 1000) / 3600 = **16.67 m/s**
- Distance = Speed × Time = **16.67 × 9 = 150 meters**

Answer: 150 meters

Q2: A shopkeeper gains 20% on an item after selling it for $240. What was the cost price?

A:

- Let Cost Price = **x**
- Selling Price = **Cost Price + 20% Profit**
- x+0.2x=240x + 0.2x = 240x+0.2x=240
- 1.2x=2401.2x = 2401.2x=240
- x=240/1.2=200x = 240 / 1.2 = 200x=240/1.2=200

Answer: $200

2. Logical Reasoning

Q3: What comes next in the series? 2, 6, 12, 20, 30, ?

A:

- Pattern: 2+4=62 + 4 = 62+4=6, 6+6=126 + 6 = 126+6=12, 12+8=2012 + 8 = 2012+8=20, 20+10=3020 + 10 = 3020+10=30
- Next term: 30+12=4230 + 12 = 4230+12=42

Answer: 42

Q4: Find the odd one out: **Apple, Mango, Banana, Carrot, Orange**

A:

- Carrot is a vegetable, while others are fruits.

Answer: Carrot

3. Verbal Ability

Q5: Choose the correct synonym for **"benevolent"**

a) Kind
b) Cruel
c) Angry
d) Dishonest

A:

Answer: a) Kind

Q6: Identify the correctly spelled word:

a) Accomodation
b) Accommadation
c) Accommodation
d) Acommodation

A:

Answer: c) Accommodation

4. Data Interpretation

Q7: A company's revenue in 2021 was $50,000. In 2022, it increased by 25%. What is the new revenue?

A:

- Increase = 50,000×25100=12,50050,000 \times \frac{25}{100} = 12,50050,000×10025=12,500
- New Revenue = 50,000+12,500=62,50050,000 + 12,500 = 62,50050,000+12,500=62,500

Answer: $62,500

5. Time & Work

Q8: A can complete a task in 10 days, and B in 15 days. How many days will they take together?

A:

- Work done by A in 1 day = **1/10**
- Work done by B in 1 day = **1/15**
- Work done together in 1 day = 110+115=3+230=530=16\frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6}101 +151=303+2=305=61
- Time taken = **6 days**

Answer: 6 days

GATE Questionsfor Competitive Exams

-Rajeshwari.N, IV ECE

1. Which one most appropriate dynamic system?

A. $y(n) + y(n - 1) + y(n + 1)$
B. $y(n) + y(n - 1)$
C. $y(n) = x(n)$
D. $y(n) + y(n - 1) + y(n + 3) = 0$

2. An energy signal has $G(f) = 10$. Its energy density spectrum is

A. 10 B. 100
C. 50 D. 20

3. In an ac circuit the fundamental component of current wave lags the corresponding voltage wave by 20°. The third harmonic component of current wave lags the corresponding voltage by an angle.

A. less than 20°
B. more than 20°
C. equal to 20°
D. equal to or more than 20°

4. A voltage $V(t)$ is a Gaussian ergodic random process with a mean of zero and a variance of 4 volt^2. If it is measured by a dc meter. The reading will be

A. 0
B. 4
C. 2
D. 2

5. A first order system will never be able to give a _____ response

1. and stop
2. band pass
3. all pass

Choose the correct option
A. 1, 2, 3 true
B. 1 and 3 true, 2 false
C. 1, 2 are true 3 is false
D. 1, 2 are false, 3 is true

6. If transfer function of a system is $H(z) = 6 + z^{-1} + z^{-2}$ then system is

A. minimun phase
B. maximum phase
C. mixed phase
D. none

7. Which one is a linear system?

A. $y[n] = x[n] \times x[n - 1]$
B. $y[n] = x[n] + x[n - 10]$
C. $y[n] = x^2[n]$
D. (a) and (c)

8. The analog signal $m(t)$ is given below $m(t) = 4 \cos 100 \pi t + 8 \sin 200 \pi t + \cos 300 \pi t$, the Nyquist sampling rate will be

A. 1/100 B. 1/200
C. 1/300 D. 1/600

9. The ROC of sequence in the Z.T. of sequence $x[n] = a^n \cup [n]$ is

A. $z>a$
B. $z<a$
C. $|z| >a$
D. $|z| <a$

10. In Laplace transform, multiplication by e^{-at} in time domain becomes

A. translation by *a* in *s* domain
B. translation by (-*a*) in *s* domain
C. multiplication by e^{-as} in s domain
D. none of the above

Answers:

1. A. y(n) + y(n - 1) + y(n + 1)
2.B.100
3. B.more than 20°
4.A.0
5.C.1, 2 are true 3 is false
6.A.minimun phase
7.B.y[n] = x[n] + x[n - 10]
8.C.1/300
9.C.|z| > a
10.A.translation by a in s domain

Fun Brain Teasers

- ***Abirami. S, IV ECE***

1. The Missing Dollar Riddle

Three friends go to a restaurant and order a meal for $30. They each contribute $10.
Later, the waiter realizes the bill was only $25 and gives $5 back to the friends.
They decide to take $1 each and leave a $2 tip.
Now, each person spent $9 (totaling $27), and the waiter has $2.
But $27 + $2 = $29—where is the missing $1?

Answer:

There is no missing dollar! The trick is in the way the calculation is framed.

- They paid $27 in total (which includes the $25 bill + $2 tip).
- The missing $1 illusion is caused by adding the tip incorrectly. Instead of adding, the tip should be subtracted from the $27, leaving the correct amount of $25.

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2. The Two Doors Riddle

You are in a room with two doors. One door leads to certain death, while the other leads to freedom.
There are two guards:

- One always tells the truth
- The other always lies

You can ask one guard only one question. What should you ask to safely exit?

Answer:

Ask either guard: "If I were to ask the other guard which door leads to freedom, what would they say?"

- The truthful guard will point to the wrong door because the liar would have lied.
- The lying guard will also point to the wrong door because he knows the truthful one would give the right answer, and he must lie.

So, whichever door is pointed to, take the other one!

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3. The Three Light Bulbs

You are in a room with three switches outside and three light bulbs inside a closed room.
You can flip the switches as many times as you want, but you can only enter the room once.
How do you determine which switch controls which bulb?

Answer:

1. Turn one switch on and leave it for a few minutes.
2. Turn it off and turn another switch on.
3. Enter the room:
    - The bulb that is on belongs to the second switch.
    - The warm but off bulb belongs to the first switch.
    - The cold bulb belongs to the third switch.

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4. The Rope & the Well

A bucket is attached to a 40-meter-long rope and lowered into a 30-meter-deep well.
A monkey grabs the rope and starts climbing up at 3 meters per second while the bucket falls at 1 meter per second. How long will it take for the monkey to reach the top?

Answer:

Since the monkey is climbing 3 m/s and the bucket is falling 1 m/s, the net climbing speed is: 3−1=23 - 1 = 23−1=2 m/s.
The monkey must climb 40 meters, so: 40/2=2040 / 2 = 2040/2=20 seconds.
So, the monkey reaches the top in 20 seconds.

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5. The Four-Digit Lock Code

A bank vault has a 4-digit lock. A detective finds these clues:

1. The code has digits 1, 2, 3, 4, 5, 6 but none repeat.
2. The 1st digit is half of the 3rd digit.
3. The 2nd digit is the largest of the four.
4. The last digit is the sum of the 1st and 3rd.

What is the lock code?

Answer:

Let’s solve step by step:

- The 1st digit is half of the 3rd digit → Possible pairs: (1,2), (2,4), (3,6).
- The 2nd digit is the largest, so it must be 6 or 5.
- The 4th digit is the sum of the 1st and 3rd.

Checking possible values:

- If 1st = 2, 3rd = 4, then 4th = 6.
- Largest digit (2nd digit) must be 5.

Thus, the code is 2 5 4 6.

Editors Desk

Meditation and its Benefits

- ***Stress reduction***

  Meditation can help you cope with stress by focusing on something calming.

- ***Anxiety management***

  Meditation can help manage anxiety by triggering neurotransmitters that modulate psychological disorders.

- ***Improved concentration***

  Meditation can help you focus your attention and become more aware of your actions.

- ***Reduced risk of stress-related ailments***

  Meditation can help reduce the risk of high blood pressure, insomnia, chronic pain, and fatigue.
  How to meditate

  - *Set aside some time*
  - *Find a comfortable place*
  - *Focus on your breath, an object, or a mantra*
  - *Bring mindfulness into your meditation*
  - *Gradually increase the length of your meditation sessions*

  Types of meditation

  - *Loving-kindness meditation*
  - *Progressive muscle relaxation*
  - *Breath awareness meditation*
  - *Mantra-based meditation*
  - *Transcendental meditation*
  - *Mindfulness-based stress reduction*
  - *Guided meditation*

Send your suggestions to:

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Department Vision

To create globally competent engineers in Electronics and Communication Engineering to meet the industrial progress for betterment of the society

Department Mission

- To create an academic ambience for quality education in the field of Electronics and Communication Engineering
- To make the best use of modern tools and software for teaching and research activities
- To promote industry-institution interaction for skill-based learning of students from rural society
- To inculcate moral and ethical values with a sense of professionalism.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO's):

1. To provide the students with a strong foundation in the required sciences in ordertopursue studiesinElectronicsand CommunicationEngineering.
2. Togainadequateknowledgetobecomegoodprofessionalinelectronicandcommunicationengineeringassociatedindustries,highereducationandresearch.
3. To develop attitude in lifelong learning, applying and adapting new ideas andtechnologiesastheirfield evolve
4. Topreparestudentstocriticallyanalyzeexistingliteratureinanareaofspecializationandethicallydevelopinnovativeandresearchorientedmethodologiesto solve the problemsidentified.
5. To inculcate in the students a professional and ethical attitude and anability tovisualizethe engineering issues in abroadersocialcontext.

PROGRAMME OUTCOMES:

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

- PSO1: Design, develop and analyze electronic systems through application of relevantelectronics,mathematicsand engineering principles
- PSO2:Design,developandanalyzecommunicationsystemsthroughapplicationoffundamentals from communication principles, signal processing, and RF System Design &Electromagnetics.
- PSO3:Adapttoemergingelectronicsandcommunicationtechnologiesanddevelopinnovativesolutionsforexistingand newer problems