SES COLLEGE SREEKANDAPURAM

(Accredited by NAAC with 'B+' Grade) Affiliated to Kannur University

Criterion 2 Teaching- Learning and Evaluation

2.5. Evaluation Process and Reforms

2.5.1 Mechanism of internal assessment is transparent and robust in terms of frequency and mode

SES COLLEGE SREEKANDAPURAM
1 Semester BSc Degree Internal Examination, November 2023
1B01 PHY: Mechanics I

Time: $1_{1/2}$ hours **Total Marks: 30**

SECTION-A
(*Answer all each carry 1 marks)*

1. The forces acting on a turtle on an elevator are…….
2. Equation of Electrostatic force is……..
3. A body moving through liquids or gases is retarded by……
4. Hook's law, Force is always directed towards ….
5. If a rectangular crate is held one corner resting on a frictionless table and the crate is gently released the centre of mass accelerates….

(1X5=5)

SECTION-B
(*Answer any four each carry 2 marks)*

6. Distinguish between inertial and non inertial frames of reference.
7. State Newton's laws.
8. What is inertia, Explain.
9. What are constraints?
10. State and explain Newton's law of gravitation
11. What are the Four fundamental forces of nature.

(4X2=8)

SECTION-C
(Answer Four each carry 3 marks)

12. A spring gun fires a marble of mass M by means of a spring and piston in a barrel. Piston and marble are pulled back a distance L from equilibrium and released. Find the speed of the marble just as it losses contact with the piston.

13. Three freight cars each of mass M are pulled with force F. Friction is negligible. Find the forces on each car.

14. A uniform rope of mass M and length L hangs from the limb of a tree . Find the tension at a distance x from the bottom.

15. A block of mass M on a horizontal frictionless surface is attached to one end of a horizontal spring whose other end is fixed. If K is spring constant, derive the solution of simple harmonic motion executed by the system.
16. What will be the motion of a bola used by Gauchos.
17. A mass m whirls with constant speed v at the end of a string of length R. Find the force on m in the absence of gravity and friction.

(4x3=12)

SECTION-D

(Answer one each carry 5 marks)

18. Apply Newtons laws to find the accelerations of two astronauts of masses M_A and M_B pulling on either ends of a rope of negligible mass.
19. With the help of a diagram explain Linear air track.

(1x5=5)

SES COLLEGE SREEKANDAPURAM
1 Semester BSc Degree Internal Examination 2, November 2022
1B01 PHY: Mechanics I

Time: $1_{1/2}$ hours **Total Marks: 25**

SECTION-A
(*Answer any four each carry 2 marks)*

1. State and write an expression for work energy theorem in 1-D.
2. Write any two cases in which work energy theorem is useful.
3. Write about nonconservative forces.
4. Explain escape velocity.
5. Explain potential energy of a uniform force force field.
6. Explain mechanical energy.

(4X2=8)

SECTION-B
(Answer Four each carry 3 marks)

7. How can we find the vibrational frequency of the molecule?
8. Using the idea of nonconservative force, explain work energy theorem.
9. If a mass m is projected upwards with an initial velocity $v_0=v_{0x}i+v_{0y}j+v_{0z}k$. Find the speed at height h using conservation of energy
10. Find the escape velocity of earth.
11. Explain work done by a central force.
12. Explain what potential energy just tells us about?.

(4x3=12)

SECTION-C
(Answer one each carry 5 marks)

13. Explain work energy theorem in several dimensions.
14. Explain energy diagrams and the applications of Newtonian mechanics and the conservation laws for momentum and energy

(1x5=5)

SES COLLEGE SREEKANDAPURAM
I Semester BSc Degree Model Examination, December 2023
1B01 PHY: Mechanics I

Time: 3 hours **Total Marks: 40**

SECTION-A
(*Answer ALL, each carry 1 mark)*

1. Give expressions for linear and angular momenta.
2. Unit of angular momentum is _____
3. Law of equal areas hold true under any _____
4. Write an expression for work energy theorem for rotational motion.
5. Expression for escape velocity is ------

(1x5=5)

SECTION-B
(Answer any Five, each carry 2 marks)

6. Explain escape velocity.
7. Explain potential energy of a uniform force force field
8. If 'r' and 'p' lies in X-Y plane, give various directions of ' L'.
9. Explain torque due to gravity.
10. Explain mechanical energy.
11. Prove that If Torque is zero angular momentum is conserved.
12. State parallel axis theorem.

(5X2=10)

SECTION-C
(Answer any Five, each carry 3 marks)

13. Using the idea of nonconservative force, explain work energy theorem.

14. If a mass m is projected upwards with an initial velocity $v_0=v_{0x}i+v_{0y}j+v_{0z}k$. Find the speed at height h using conservation of energy

15. Find the escape velocity of earth.

16. A uniform drum of radius b and mass M rolls without slipping down a plane inclined at a particular angle, Find the acceleration along the plane. Moment of inertia about its axis is $Mb^2/2$.
17. Explain simple pendulum.
18. Explain Physical Pendulum.
19. Write the expressions of Torque on a sliding block.

(5x3=15)

SECTION-D

(Answer any Two, each carry 5 marks)

20. Write the expression for acceleration in the case of Atwood's machine with massive pulley.
21. Explain work energy theorem in several dimensions.
22. Explain energy diagrams and the applications of Newtonian mechanics and the conservation laws for momentum and energy
23. State and prove law of equal areas.

(2x5=10)

SES COLLEGE SREEKANDAPURAM

I Semester BSc Degree Model Examination, INTERNALS

1B01 PHY: Mechanics I

SL.NO:	Reg.NO:	NAME OF STUDENT	CT1(30)	CT2(25)	MODEL (40)
1	SE23CPHR01	ANJANA MUKUNDAN	26	25	37
2	SE23CPHR02	ATHISAYA R SREEDHAR	AB	22	28
3	SE23CPHR03	FATHIMATH NAJIYA K	28	25	32
4	SE23CPHR04	JISHNA K	28	25	38
5	SE23CPHR05	NEERAJA JAYARAJ	26	19	29
6	SE23CPHR06	VARSHA V B	27	25	33
7	SE23CPHR07	ABHINAV A	08	02	11
8	SE23CPHR08	ADWAITH K V	28	25	37
9	SE23CPHR09	CHETHAK P	18	05	25
10	SE23CPHR10	THUSHAR BABU A	27	12	17
11	SE23CPHR11	FATHIMATHUL FIDHA V	18	03	22
12	SE23CPHR12	ADHARV C P	24	25	32
13	SE23CPHR13	AMARNATH C C	15	AB	16
14	SE23CPHR14	SIVAJITH K P	22	15	20
15	SE23CPHR15	VIPIN P	24	17	11
16	SE23CPHR16	YADHUKRISHNA R	15	11	14

23-24.

IBOI PH4 Mechanics I – Internals.

Internal distribution ⇒ Exam → 6
Assi/sem/viva – 4

		CT1 (30)	CT2 (25)	Assignment + Seminar	CT3 (25)	Model (40)	Internal distribution	Internal (10)	Signature
1	Anjana Mukundan	26	25	✓	S 25	37	5.8 + 4 = 9.8	10	
2	Abhinav A	08	02	✓	S 05	11	1.6 + 4 = 5.6	6	
3	Adwaith K V	28	25	✓	S 19	37	5.8 + 4 = 9.8	10	
4	Anjana K	AB	AB	—		AB			
5	Athisaya R Sreedhar	AB	22	✓	S 12	28	4.7 + 4 = 8.7	9	
6	Chothak P	18	05	✓	S 16	25	3.7 + 4 = 7.7	8	
7	Fathimath Najiya K	28	25	✓	S AB	32	5.5 + 4 = 9.5	10	
8	Jishna K	28	25	✓	S 25	38	5.9 + 4 = 9.9	10	
9	Thushar Babu A	27	12	✓	S 15	17	4.5 + 4 = 8.5	9	
10	Varsha V B	27	06	✓	S 25	33	5.5 + 4 = 9.5	10	
11	Adharv C P	24	25	✓	S 21	32	5.5 + 4 = 9.5	10	
12	Amarnath C C	15	–	✓	S 12	16	2.7 + 4 = 6.7	7	
13	Fathimathul Fidha V	14+4	03	✓	S 22	22	4.3 + 4 = 8.3	8	
14	Neeraja Jayaraj	26	19	✓	S 24	29	5 + 4 = 9.0	9	
15	Sivajith K.P	22	15	✓	S 15	20	3.7 + 4 = 7.7	8	
16	Vipin P	24	17	✓	S 11	11	3.5 + 4 = 7.5	8	
17	Yadhu Krishna R	15	11	✓	S 12	14	2.6 + 4 = 6.6	7	

SES COLLEGE SREEKANDAPURAM

KANNUR

Name of Examination : 3rd Sem Model Examination
(Course & Year)

Subject : Electronics - Communication System

Code : 3C03 ELE

Date 0 3 | 1 1 | 2 0 2 3
DATE MONTH Y E A R

No. of Booklets used

Question No.	Mark	Question No.	Mark
1	0	31	
2	1	32	
3	0	33	
4	2 1	34	
5	1	35	
6	2	36	
7	1	37	
8		38	
9	1	39	
10	13	40	
11	1	41	
12		42	
13	3	43	
14	1	44	
15		45	
16	1	46	
17		47	
18		48	
19	1	49	
20	13	50	
21		51	
22		52	
23		53	
24		54	
25		55	
26		56	
27		57	
28		58	
29		59	
30		60	

Total Marks : Percentage : Grade:

Register No.

SE22CPHR08

Name of Examination
(Course & Year)

3rd Sem Model Examination

Subject Complementary Edective course Electronics

Paper Communication System

Code 3C03 ELE

Signature of the Candidate

31/11/23

Signature of the Invigilator

Booklet No.

4969

Medium frequency

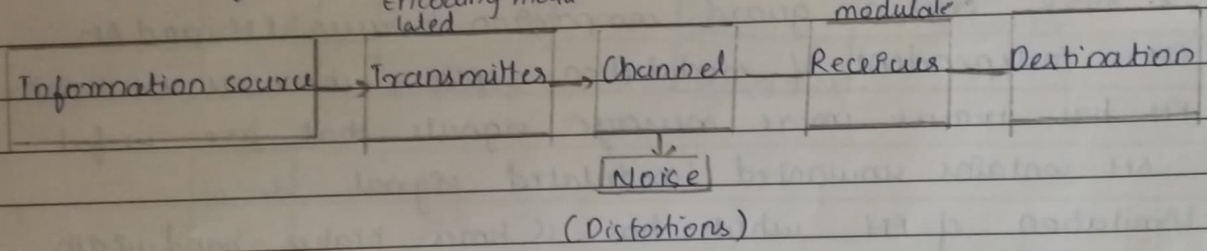
2. Channel is the physical medium connecting the transmitter and receives. The physical medium can be made up of coaxial wire, copper wire, optic fibre cable etc.

3. having discrete values which creates the message signal which describes the shape of the signal.

4. Signal to noise ratio is defined as the ratio of signal power to the ratio of noise power.

5. Pulse code Modulation

6. Block diagram of communication system



7. Need for modulation

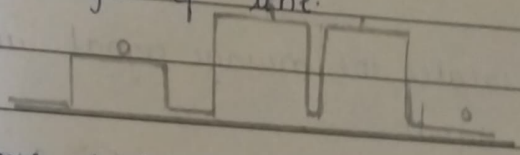
There exist two quantities.

- A physical quantity for regulation
- Another physical quantity to be regulated.

The message signal carry cannot travel along long distance by itself it needs a carry for the transmission the use of modulated signal is required for shifting range frequencies

Selectivity - The process of removing unwanted message signal

2. Bit rate. The bit rate is defined as the number of bits transmitted per second.
Bit rate = Baud rate x Number of changes in bits
Baud rate - it is the number of changes of state occuring. It can be also defined as the number of changes of tone.



Here 4 changes of state. It

11. Pulse width modulation. Width of the pulse which has has variation in its width which is proportion to its message signal. (PWM)

8. Comparison of FM and AM.
- G. There exist a guard comparison between FM and AM
- FM is independent of modulation depth, where as AM is not.
- FM has ~~waves~~ more message signals that are useful AM contains unwanted modulated signal.
- Limitation of FM which has 15 times higher bandwidth than amplitude modulation.

14. ASK and FSK
ASK - Amplitude Shifting Key
The amplitude of the process of shifting amplitude of the carries signal between two levels that is the binary number 0's and 1's. $V_c = V_c \sin \omega_c t$

5. ~~AM transmitter~~
- ~~FM is increased on the efficiency~~

K - ~~FM~~ Field shifting key - The process of shifting of frequency carries signal between two levels 0 and 1 - FSK - 2 carr
$V_{c_1} = V_c \sin \omega_{c_1} t$

The modulation index of an AM

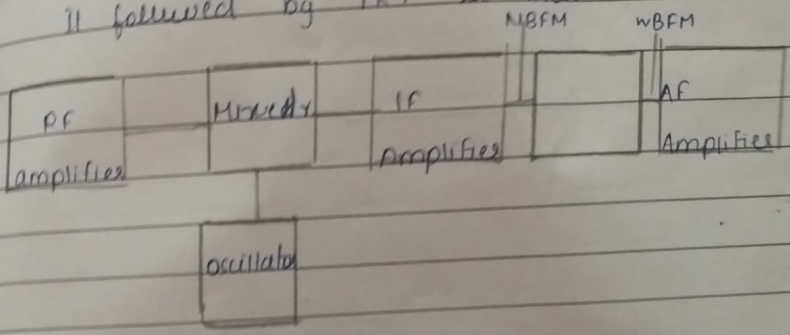
$$V_m = \frac{V_{max} - V_{min}}{x}$$

$$V_c = \frac{V_{max} + V_{min}}{x}$$

$$\frac{V_m}{V_c} = \frac{\frac{V_{max} - V_{min}}{x}}{\frac{V_{max} + V_{min}}{x}} = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}$$

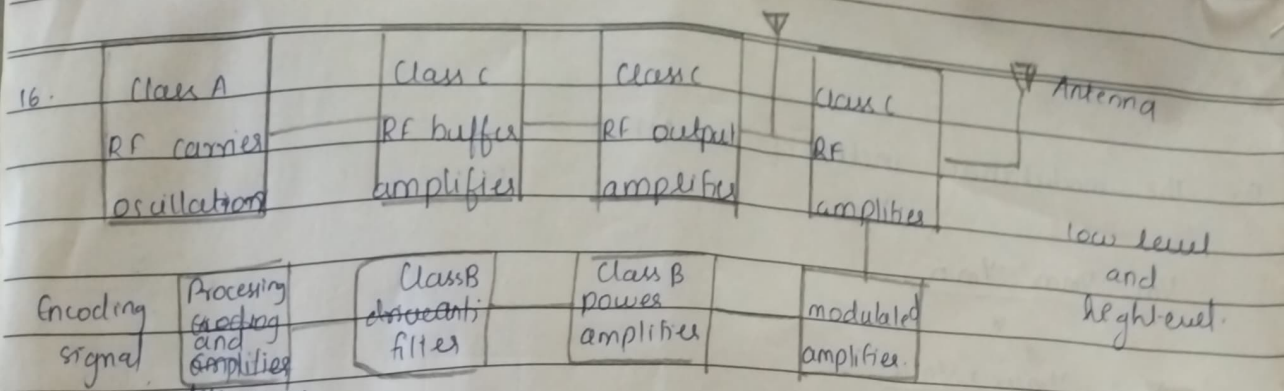
modulated index $= \frac{V_m}{V_c}$

Q. Super hetero-dyne radio receiver.
It followed by IRF it has



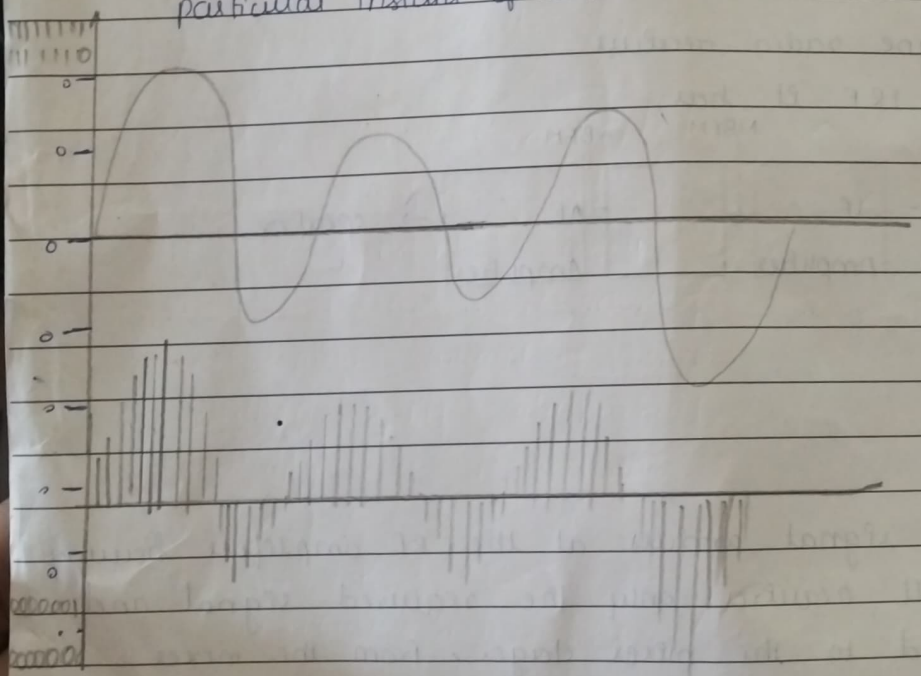
The radio message signal arrives at the RF amplifier having RF source. It acquires only the required signal and is then transmitted to the mixer stage. From the mixer stage, the amplified message signal are selectively taken from the intermediate frequency amplifier range.
In that stage the m modulated signal which has a very narrow frequency range for the passage of signal such that here exist the process of selectivity having only passed to the AF amplifier. Only the required modulated signals are passed to the next stage and finally after the involvement of radio signal from the RF amplifier and finally to AF amplifier which has wide band fm transmit the modulated signal through the speaker.
This * IF amplifier has the removal of unwanted signal and only required signals is passed it is hence called the superheterodyne receiver

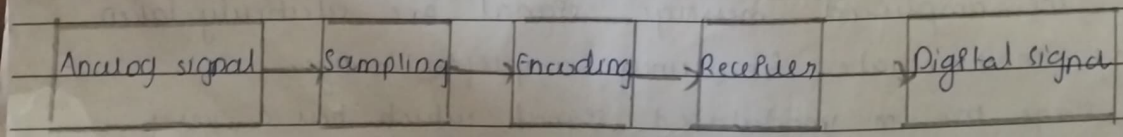
16.



19. PCM - Pulse code modulation.

It The amplitude of the pulse code modulation has discrete values. It ~~happen~~ This process does amplification. at a particular instant of time.





Block diagram for pulse code modulation.

ASSIGNMENT

/12/23

By,

ASSIGNMENT

By,
Anaraj Mattankot.

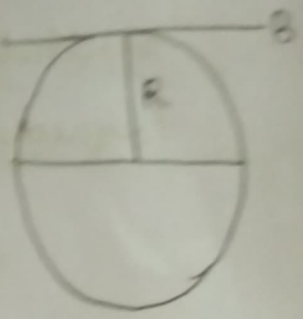
12/12/23

Calculate the MI & radius of gyration of a disc of mass 1.2 kg & radius 8cm about

i) its diameter

ii) an axis ⊥ to the diameter & tangent to the disc

i) MI about its diameter, $I_d = \frac{MR^2}{4}$



$= \frac{1.2 \times (8\times10^{-2})^2}{4} = \frac{1.2\times64\times10^{-4}}{4}$

$= \frac{76.8\times10^{-4}}{4} = \underline{19.2\times10^{-4}}$

Radius of gyration, $k = \frac{R}{2} = \frac{8\times10^{-2}}{2} = \underline{4\times10^{-2}}$

ii) MI of, $I = \frac{5}{4}MR^2$

$= \frac{5\times1.2\times64\times10^{-4}}{4}$

$= \underline{96\times10^{-4}}$

radius of gyration, $k = \frac{\sqrt{5}}{2} \times R$

$= \frac{\sqrt{5}\times8\times10^{-2}}{2}$

$= \sqrt{5}\times4\times10^{-2}$

$= \underline{8.94\times10^{-2}}$

The eqn of a transverse wave travelling along a stretched string is given by $y = 5\sin 2\pi\left(\frac{x}{100} - \frac{t}{0.02}\right)$ with length expressed in cm & time in sec. Find amplitude, frequency, velocity & wave length?

Velocity, $v = f\lambda$

$= 1 \times 200 = 200$ cm/s

Q14) A simple harmonic wave is represented by, $y = 5\sin\left(2\pi\left(\frac{t}{0.05} - 0.05x\right)\right)$ where y & x are in cm. find the wave length, velocity of wave. Also find the velocity of the particle at a distance 10 cm from origin at an instant 1sec later.

$y = 5\sin\left(2\pi\left(\frac{t}{0.05} - 0.05x\right)\right)$

$y = 5\sin\left(\frac{2\pi}{0.05}t - 2\pi \times 0.05 x\right)$

$y = A\sin(\omega t - kx)$

$\lambda = \frac{2\pi}{k} = \frac{2\pi}{2\pi \times 0.05} = \frac{1}{0.05} = 20$ cm

$f = \frac{\omega}{2\pi} = \frac{2\pi}{0.05} \times \frac{1}{2\pi} = \frac{1}{0.05} = \underline{\underline{20\ Hz}}$

$v = f\lambda = 20 \times 20 = \underline{\underline{400 cm/s}}$

$v = \frac{dy}{dt} = 5\cos\left(\frac{2\pi}{0.05}t - 2\pi \times 0.05x\right) \times \frac{2\pi}{0.05}$

$= \frac{2\pi}{0.05} \times 5 \cdot \cos\left(\frac{2\pi}{0.05}t - 2\pi \times 0.05x\right)$

@ $t = 1$, $x = 10$

$v = \frac{2\pi}{0.05} \times 5 \cos\left(\frac{2\pi}{0.05} - 2\pi \times 0.05 \times 10\right)$

$= 628 \cdot \cos(125.6 - 3.14)$

$= 628 \cos(122.46)$

$= -337.05$

$$y = 5 \sin 2\pi\left(\frac{x}{100} - \frac{t}{0.02}\right)$$

$$y = 5 \sin\left(\frac{2\pi}{100}x - \frac{2\pi}{0.02}t\right)$$

$$y = A \sin(kx - \omega t)$$

Amplitude, $A = \underline{5}$

frequency, $f = \frac{\omega}{2\pi} = \frac{2\pi}{0.02} \times \frac{1}{2\pi}$

$= \underline{50\ Hz}$

$\omega = 2\pi f$

$f = \frac{\omega}{2\pi}$

wave length, $\lambda = \frac{2\pi}{k} = 2\pi \times \frac{100}{2\pi}$

$\lambda = \underline{100\ cm}$

$k = \frac{2\pi}{\lambda}$

velocity, $v = f\lambda$

$= 50 \times 100 = \underline{5000\ cm/s}$

Q3) The eqn of a transverse wave travelling along a stretched string is given by $y = 10 \sin\{\pi(2t - 0.01x)\}$ where y & x are in cm. & t in sec. Find amplitude, frequency, velocity & wave length of the wave?

$y = 10 \sin\{\pi(2t - 0.01x)\}$

$y = 10 \sin(2\pi t - \pi 0.01x)$

$y = A \sin(\omega t - kx)$

amplitude, $A = 10$

freaquency, $f = \frac{\omega}{2\pi} = \frac{2\pi}{2\pi} = 1\ Hz$

wave length, $\lambda = \frac{2\pi}{k} = \frac{2\pi}{\pi \times 0.01} = \frac{2}{0.01} = 200\ cm$

ASSIGNMENT

26/2/24

IRFANA. P.P.
BSc. Physics
66212PHR16.

- What is the radius of 1st half period zone in a zone plate behaving like a convex lens of focal length 60cm for light of wavelength 6000A°.

for a zone plate,
the focal length $f = \frac{r_n^2}{n\lambda}$

where r_n is the radius of the n^{th} half period zone, and λ is the wavelength of light.

Here, $f = 60\,cm = 0.6\,m$ and $n = 1$

$\lambda = 6000A^\circ = 6000 \times 10^{-10}\,m.$

then $r_1^2 = f n \lambda = 0.6 \times 1 \times 6000 \times 10^{-10}.$

$= 3.6 \times 10^{-7}\,m.$

radius of 1st half period zone $r_1 = \underline{0.6\,mm}$

- Find the radii of the first 3 transparent zones of a zone plate whose 1st focal length is 1m for $\lambda = 5893A^\circ$.

A. focal length $f = 1m$
wavelength $\lambda = 5893A^\circ.$

$$f = \frac{r_n^2}{n\lambda}$$

$$r_n = \sqrt{f n \lambda}$$

For 1st transparent zone, $n = 1$
then radius $r_1 = \sqrt{f \times 1 \times \lambda} = \sqrt{1 \times 5893 \times 10^{-10}} = \underline{0.7\,mm}$

radius of 2nd transparent zone $r_2 = \sqrt{f \times 2 \times \lambda}$

$= \underline{1\,mm.}$

radius of 3rd transparent zone $r_3 = \sqrt{3 \times f \times \lambda} = \underline{1.3\,mm}$

The diameter of 1st ring of a zone plate is 1.1 mm. If a plane of wavelength 6000 A° fall on a plate, where should the screen be placed so that image is formed as a bright spot ?

Diameter of 1st ring of zone plate = 1.1 mm

Radius $r_1 = \frac{1.1\,mm}{2} = 5.5 \times 10^{-4}\,m$

wavelength of light $\lambda = 6000\,A^\circ = 6000 \times 10^{-10}\,m$.

$$f = \frac{r_1^2}{\lambda} = \frac{(5.5 \times 10^{-4})^2}{6000 \times 10^{-10}} = 0.504\,m$$

The Screen should be placed 0.504 metre apart from the zone plate.

A zone plate gives a series of images of a point source on its axis of the first and second strongest images are at distance of 30cm and 6cm respectively from the zone plate both on the same side from the source. Calculate the distance of source from the zone plate.

we know, $\frac{1}{b} - \frac{1}{a} = \frac{1}{f}$ ——— (1).

where b is the distance from zone plate. b the image a is the distance from source to zone plate and 'f' is the focal length of zone plate.

Given that,

The distance of the first strongest image = 30cm
$b_1 = 0.3m$.

The distance of the second strongest image $b_2 = 6cm$
$= 0.06m$.

then by eqn ①.

$$\frac{1}{0.3} = \frac{1}{f} + \frac{1}{a} \quad \text{——②}$$

$$\frac{1}{0.06} = \frac{1}{f} + \frac{1}{a} \quad \text{——③}$$

Substracting ③ from ②.

$$\frac{1}{0.3} - \frac{1}{0.06} = 0.$$

But we consider $\frac{1}{a} \neq 0$.

then. $\frac{1}{0.3} - \frac{1}{0.06} = \frac{1}{a}$.

$$\frac{-0.24}{0.018} = \frac{1}{a}.$$

$$-13.315 = \frac{1}{a}$$

$$a = -0.0751 \text{ m}$$

Since the source and the images are on the same side of the zone plate, the distance a must be positive

Thus, the distance of the source from zone plate $a = 0.075$ m.

SES COLLEGE SREEKANDAPURAM

KANNUR

Name of Examination : 3rd Sem Model Examination
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Subject : Electronics - Communication System

Code : 3C03 ELE

Date 0 3 | 1 1 | 2 0 2 3
DATE MONTH Y E A R

No. of Booklets used

Question No.	Mark	Question No.	Mark
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11	1	41	
12		42	
13	3	43	
14	1	44	
15		45	
16	1	46	
17		47	
18		48	
19	1	49	
20	13	50	
21		51	
22		52	
23		53	
24		54	
25		55	
26		56	
27		57	
28		58	
29		59	
30		60	

Total Marks : Percentage : Grade:

Register No.

SE22CPHR08

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3rd Sem Model Examination

Subject Complementary Edective course Electronics

Paper Communication System

Code 3C03 ELE

Signature of the Candidate

31/11/23

Signature of the Invigilator

Booklet No.

4969

Medium frequency

2. Channel is the physical medium connecting the transmitter and receives. The physical medium can be made up of coaxial wire, copper wire, optic fibre cable etc.

3. having discrete values which creates the message signal which describes the shape of the signal.

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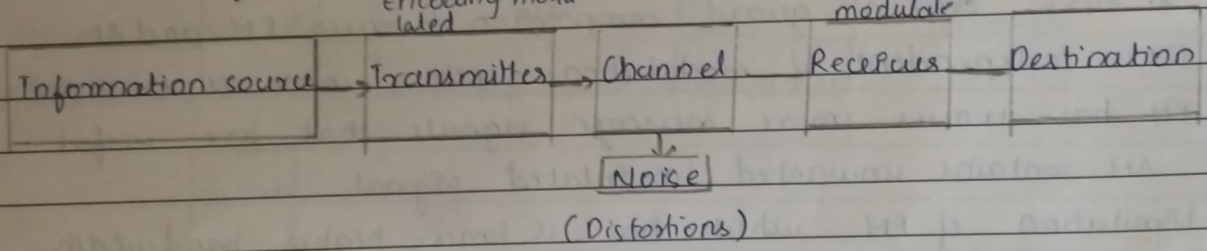
5. Pulse code Modulation

6. Block diagram of communication system



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There exist two quantities.

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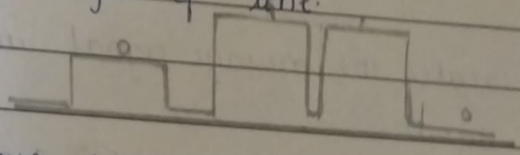
Selectivity - The process of removing unwanted message signal

2. Bit rate. The bit rate is defined as the number of bits transmitted per second.
Bit rate = Baud rate x Number of changes in bits
Baud rate - it is the number of changes of state occuring. It can be also defined as the number of changes of tone.



Here 4 changes of state. It

11. Pulse width modulation. Width of the pulse which has has variation in its width which is proportion to its message signal. (PWM)

8. Comparison of FM and AM.
- G. There exist a guard comparison between FM and AM
- FM is independent of modulation depth, where as AM is not.
- FM has ~~waves~~ more message signals that are useful AM contains unwanted modulated signal.
- Limitation of FM which has 15 times higher bandwidth than amplitude modulation.

14. ASK and FSK
ASK - Amplitude Shifting Key
The amplitude of the process of shifting amplitude of the carries signal between two levels that is the binary number 0's and 1's. $V_c = V_c \sin \omega_c t$

5. ~~AM transmitter~~
- ~~FM is increased on the efficiency~~

K - ~~FM~~ Field shifting key - The process of shifting of frequency carries signal between two levels 0 and 1 - FSK - 2 carr
$V_{c_1} = V_c \sin \omega_{c_1} t$

The modulation index of an AM

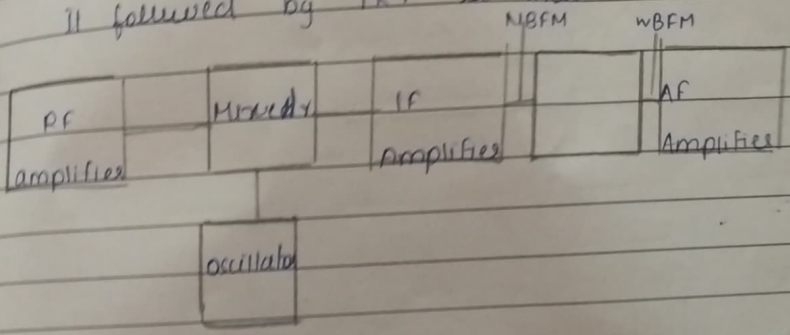
$$V_m = \frac{V_{max} - V_{min}}{x}$$

$$V_c = \frac{V_{max} + V_{min}}{x}$$

$$\frac{V_m}{V_c} = \frac{\frac{V_{max} - V_{min}}{x}}{\frac{V_{max} + V_{min}}{x}} = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}$$

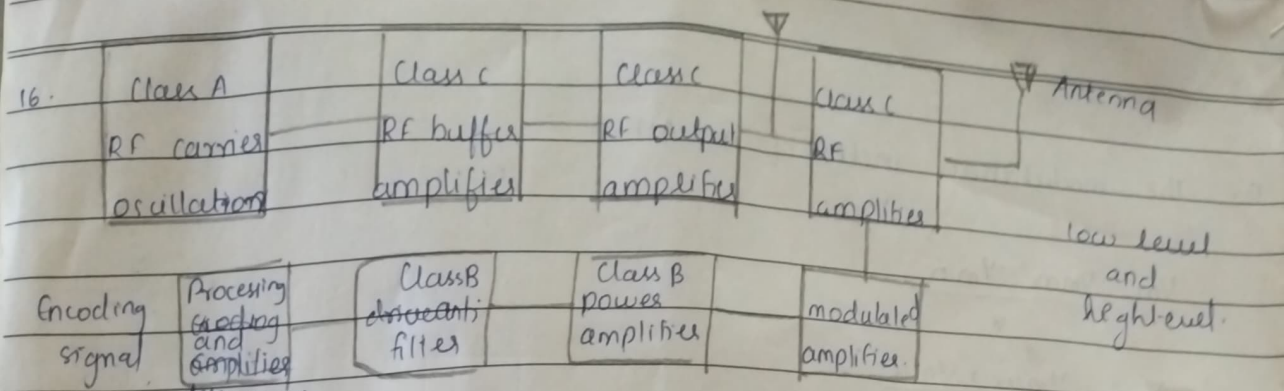
modulated index $= \frac{V_m}{V_c}$

Q. Super hetero-dyne radio receiver.
It followed by IRF it has



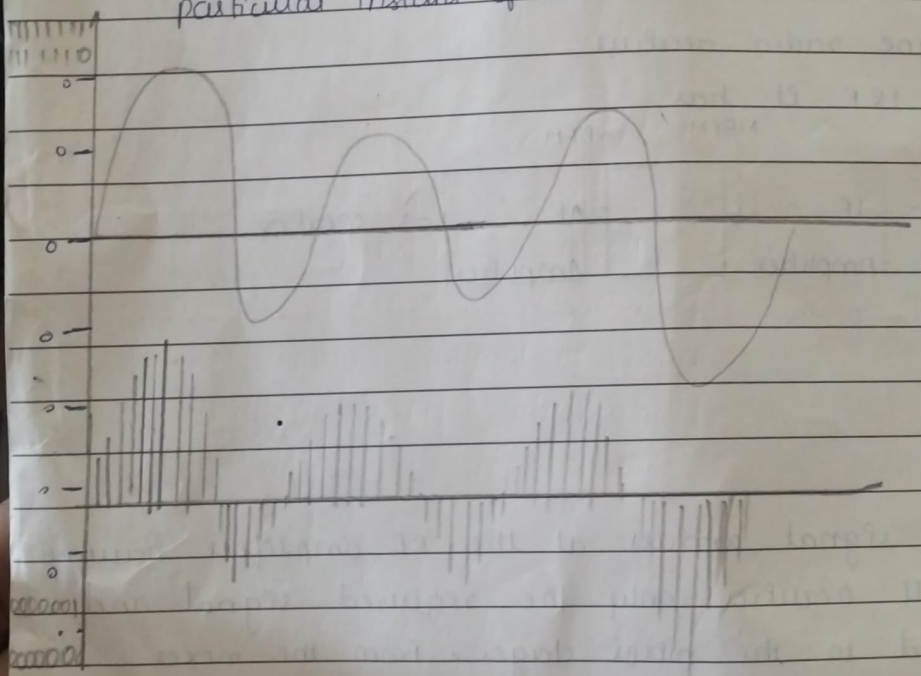
The radio message signal arrives at the RF amplifier having RF source. It acquires only the required signal and is then transmitted to the mixer stage. From the mixer stage, the amplified message signal are selectively taken from the intermediate frequency amplifier range.
In that stage the m modulated signal which has a very narrow frequency range for the passage of signal such that here exist the process of selectivity having only passed to the AF amplifier. Only the required modulated signals are passed to the next stage and finally after the involvement of radio signal from the RF amplifier and finally to AF amplifier which has wide band fm transmit the modulated signal through the speaker.
This * IF amplifier has the removal of unwanted signal and only required signals is passed it is hence called the superheterodyne receiver

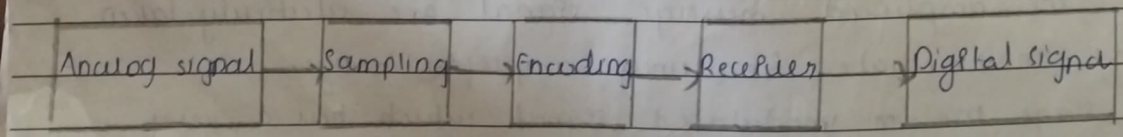
16.



19. PCM - Pulse code modulation.

It The amplitude of the pulse code modulation has discrete values. It ~~happen~~ This process does amplification. at a particular instant of time.





Block diagram for pulse code modulation.

ASSIGNMENT

[illegible]/2/23

By,

ASSIGNMENT

By,
Anaraj Mattankot.

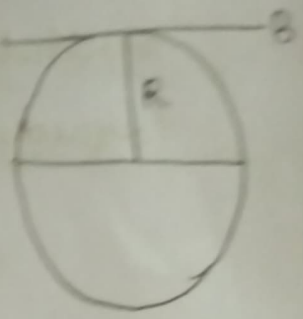
12/12/23

Calculate the MI & radius of gyration of a disc of mass 1.2 kg & radius 8cm about

i) its diameter

ii) an axis ⊥ to the diameter & tangent to the disc

i) MI about its diameter, $I_d = \frac{MR^2}{4}$



$= \frac{1.2 \times (8\times10^{-2})^2}{4} = \frac{1.2\times64\times10^{-4}}{4}$

$= \frac{76.8\times10^{-4}}{4} = \underline{19.2\times10^{-4}}$

Radius of gyration, $k = \frac{R}{2} = \frac{8\times10^{-2}}{2} = \underline{4\times10^{-2}}$

ii) MI of, $I = \frac{5}{4}MR^2$

$= \frac{5\times1.2\times64\times10^{-4}}{4}$

$= \underline{96\times10^{-4}}$

radius of gyration, $k = \frac{\sqrt{5}}{2} \times R$

$= \frac{\sqrt{5}\times8\times10^{-2}}{2}$

$= \sqrt{5}\times4\times10^{-2}$

$= \underline{8.94\times10^{-2}}$

The eqn of a transverse wave travelling along a stretched string is given by $y = 5\sin 2\pi\left(\frac{x}{100} - \frac{t}{0.02}\right)$ with length expressed in cm & time in sec. Find amplitude, frequency, velocity & wave length?

Velocity, $v = f\lambda$

$= 1 \times 200 = 200$ cm/s

Q14) A simple harmonic wave is represented by, $y = 5\sin\left(2\pi\left(\frac{t}{0.05} - 0.05x\right)\right)$ where y & x are in cm. find the wave length, velocity of wave. Also find the velocity of the particle at a distance 10 cm from origin at an instant 1sec later.

$y = 5\sin\left(2\pi\left(\frac{t}{0.05} - 0.05x\right)\right)$

$y = 5\sin\left(\frac{2\pi}{0.05}t - 2\pi \times 0.05 x\right)$

$y = A\sin(\omega t - kx)$

$\lambda = \frac{2\pi}{k} = \frac{2\pi}{2\pi \times 0.05} = \frac{1}{0.05} = 20$ cm

$f = \frac{\omega}{2\pi} = \frac{2\pi}{0.05} \times \frac{1}{2\pi} = \frac{1}{0.05} = \underline{\underline{20\ Hz}}$

$v = f\lambda = 20 \times 20 = \underline{\underline{400 cm/s}}$

$v = \frac{dy}{dt} = 5\cos\left(\frac{2\pi}{0.05}t - 2\pi \times 0.05x\right) \times \frac{2\pi}{0.05}$

$= \frac{2\pi}{0.05} \times 5 \cdot \cos\left(\frac{2\pi}{0.05}t - 2\pi \times 0.05x\right)$

@ $t = 1$, $x = 10$

$v = \frac{2\pi}{0.05} \times 5 \cos\left(\frac{2\pi}{0.05} - 2\pi \times 0.05 \times 10\right)$

$= 628 \cdot \cos(125.6 - 3.14)$

$= 628 \cos(122.46)$

$= -337.05$

$$y = 5 \sin 2\pi\left(\frac{x}{100} - \frac{t}{0.02}\right)$$

$$y = 5 \sin\left(\frac{2\pi}{100}x - \frac{2\pi}{0.02}t\right)$$

$$y = A \sin(kx - \omega t)$$

Amplitude, $A = \underline{5}$

frequency, $f = \frac{\omega}{2\pi} = \frac{2\pi}{0.02} \times \frac{1}{2\pi}$

$= \underline{50\ Hz}$

$\omega = 2\pi f$

$f = \frac{\omega}{2\pi}$

wave length, $\lambda = \frac{2\pi}{k} = 2\pi \times \frac{100}{2\pi}$

$\lambda = \underline{100\ cm}$

$k = \frac{2\pi}{\lambda}$

velocity, $v = f\lambda$

$= 50 \times 100 = \underline{5000\ cm/s}$

Q3) The eqn of a transverse wave travelling along a stretched string is given by $y = 10 \sin\{\pi(2t - 0.01x)\}$ where y & x are in cm. & t in sec. Find amplitude, frequency, velocity & wave length of the wave?

$y = 10 \sin\{\pi(2t - 0.01x)\}$

$y = 10 \sin(2\pi t - \pi 0.01x)$

$y = A \sin(\omega t - kx)$

amplitude, $A = 10$

freaquency, $f = \frac{\omega}{2\pi} = \frac{2\pi}{2\pi} = 1\ Hz$

wave length, $\lambda = \frac{2\pi}{k} = \frac{2\pi}{\pi \times 0.01} = \frac{2}{0.01} = 200\ cm$

ASSIGNMENT

26/2/24

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BSc. Physics
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- What is the radius of 1st half period zone in a zone plate behaving like a convex lens of focal length 60cm for light of wavelength 6000A°.

for a zone plate,
the focal length $f = \frac{r_n^2}{n\lambda}$

where r_n is the radius of the n^{th} half period zone, and λ is the wavelength of light.

Here, $f = 60\,cm = 0.6\,m$ and $n = 1$

$\lambda = 6000A^\circ = 6000 \times 10^{-10}\,m.$

then $r_1^2 = f n \lambda = 0.6 \times 1 \times 6000 \times 10^{-10}.$

$= 3.6 \times 10^{-7}\,m.$

radius of 1st half period zone $r_1 = \underline{0.6\,mm}$

- Find the radii of the first 3 transparent zones of a zone plate whose 1st focal length is 1m for $\lambda = 5893A^\circ$.

A. focal length $f = 1m$
wavelength $\lambda = 5893A^\circ.$

$$f = \frac{r_n^2}{n\lambda}$$

$$r_n = \sqrt{f n \lambda}$$

For 1st transparent zone, $n = 1$
then radius $r_1 = \sqrt{f \times 1 \times \lambda} = \sqrt{1 \times 5893 \times 10^{-10}} = \underline{0.7\,mm}$

radius of 2nd transparent zone $r_2 = \sqrt{f \times 2 \times \lambda}$

$= \underline{1\,mm.}$

radius of 3rd transparent zone $r_3 = \sqrt{3 \times f \times \lambda} = \underline{1.3\,mm}$

The diameter of 1st ring of a zone plate is 1.1 mm. If a plane of wavelength 6000 A° fall on a plate, where should the screen be placed so that image is formed as a bright spot ?

Diameter of 1st ring of zone plate = 1.1 mm

Radius $r_1 = \frac{1.1\,mm}{2} = 5.5 \times 10^{-4}\,m$

wavelength of light $\lambda = 6000\,A^\circ = 6000 \times 10^{-10}\,m$.

$$f = \frac{r_1^2}{\lambda} = \frac{(5.5 \times 10^{-4})^2}{6000 \times 10^{-10}} = 0.504\,m$$

The Screen should be placed 0.504 metre apart from the zone plate.

A zone plate gives a series of images of a point source on its axis of the first and second strongest images are at distance of 30cm and 6cm respectively from the zone plate both on the same side from the source. Calculate the distance of source from the zone plate.

we know, $\frac{1}{b} - \frac{1}{a} = \frac{1}{f}$ ——— (1).

where b is the distance from zone plate. b the image a is the distance from source to zone plate and 'f' is the focal length of zone plate.

Given that,

The distance of the first strongest image = 30cm
$b_1 = 0.3m$.

The distance of the second strongest image $b_2 = 6cm$
$= 0.06m$.

then by eqn ①.

$$\frac{1}{0.3} = \frac{1}{f} + \frac{1}{a} \quad \text{——②}$$

$$\frac{1}{0.06} = \frac{1}{f} + \frac{1}{a} \quad \text{——③}$$

Substracting ③ from ②.

$$\frac{1}{0.3} - \frac{1}{0.06} = 0.$$

But we consider $\frac{1}{a} \neq 0$.

then. $\frac{1}{0.3} - \frac{1}{0.06} = \frac{1}{a}$.

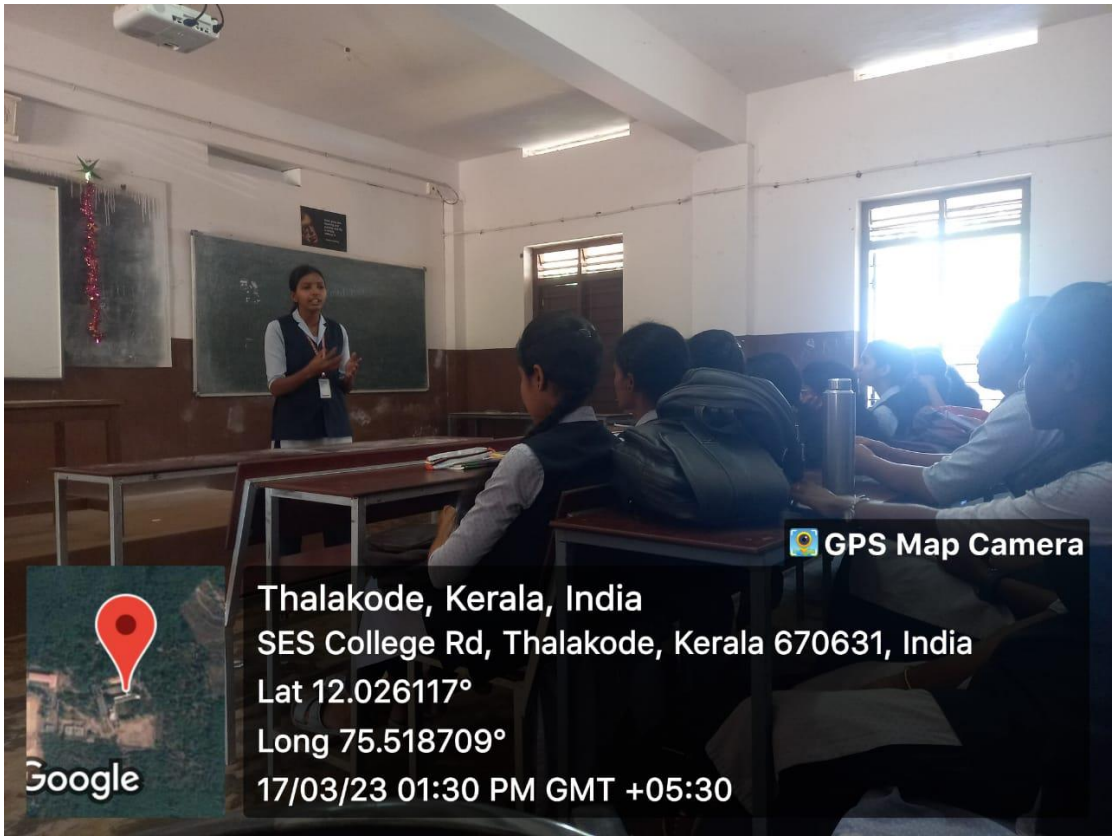
$$\frac{-0.24}{0.018} = \frac{1}{a}.$$

$$-13.315 = \frac{1}{a}$$

$$a = -0.0751 \text{ m}$$

Since the source and the images are on the same side of the zone plate, the distance a must be positive

Thus, the distance of the source from zone plate $a = 0.075$ m.


GPS Map Camera
Thalakode, Kerala, India
SES College Rd, Thalakode, Kerala 670631, India
Lat 12.026117°
Long 75.518709°
17/03/23 01:30 PM GMT +05:30
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Father of graph theory
Leonhard Euler: (Swiss Mathematician)
GPS Map Camera
Kannur, Kerala, India
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