

Modified

# CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

17EC755

## Seventh Semester B.E. Degree Examination, Jan./Feb.2021 Satellite Communication

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Define and explain three laws of Kepler to describe the motion of an artificial satellite around earth. (10 Marks)
- b. Briefly explain any five orbital parameters to determine a satellite orbit with suitable sketches. (10 Marks)

OR

- 2 a. With neat sketches, explain satellite stabilization. (10 Marks)
- b. Define Eclipses. With a neat diagram, explain solar and lunar eclipse. (10 Marks)

### Module-2

- 3 a. Explain solar energy driven power supply system of a satellite. (10 Marks)
- b. Describe the Telemetry, Tele command and tracking control monitoring system of a communication satellite. (10 Marks)

OR

- 4 a. List and explain the types of earth stations on basis of service provided by them and their usage. (10 Marks)
- b. Discuss in detail about earth station testing (any one method in mandatory tests). (10 Marks)

### Module-3

- 5 a. Describe the important parameters that influence the design of a satellite communication link. (08 Marks)
- b. Briefly explain the basic concepts of TDMA and FDMA. (12 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

**OR**

- 6 a. Explain general TDMA frame structure. (10 Marks)  
b. With usual notation, derive satellite transmission equation. (06 Marks)  
c. Discuss about CDMA. (04 Marks)

**Module-4**

- 7 a. With neat sketches, explain VSAT. (10 Marks)  
b. Explain communication relation application of satellite. (10 Marks)

**OR**

- 8 a. Define transponder. Explain the types of transponder used in satellite. (10 Marks)  
b. Discuss the advantages and disadvantages of satellite over terrestrial network. (06 Marks)  
c. List the frequency bands used in satellite communication. (04 Marks)

**Module-5**

- 9 a. Classify the sensors used in remote sensing satellites and explain remote sensing system. (10 Marks)  
b. With suitable sketches, explain working of GPS. (10 Marks)

**OR**

- 10 a. Mention the applications of weather forecasting satellites and also remote sensing satellites. (10 Marks)  
b. Explain microwave remote sensing and thermal remote sensing system. (10 Marks)

\* \* \* \* \*



ಜೆ ಎಸ್ ಎಸ್ ಮಹಾವಿದ್ಯಾಲಯ  
ಜೆ ಎಸ್ ಎಸ್ ತಾಂತ್ರಿಕ ಶಿಕ್ಷಣ ಅಕಾಡೆಮಿ  
JSS ACADEMY OF TECHNICAL EDUCATION  
(Affiliated to VTU Belgaum & Approved by AICTE, New Delhi)

Prof. MRITYUNJAYA V. LATTE  
Principal M.E., Ph.D.,

Date: 24-02-2021

To,  
The Registrar (Evaluation)  
Visvesvaraya Technological University  
Belagavi

Dear Sir,

It is certified that, the following question papers, scheme and solutions are verified and found to be in order with note of minor corrections.

Sl No.	Sub code	Subject Name	Remarks
1	17EC72	Digital Image Processing.	1. Q3a.Diagram 2Marks, Explanation 8Marks. 2. Q3b.Marks split-up missing. Corrected as- 2+2+2+2+2. 3. Q5b i) Estimation by image observation 5 Marks. ii)Estimation by experimentation- 5 marks.
2	17TE72	Satellite Communication and remote Sensing.	No Modifications.
3	17EC741	Multimedia Communication.	No Modifications.
4	17EC743	Real Time Systems.	No Modifications.
5	17EC744	Cryptography.	No Modifications.
6	17EC751	DSP Algorithm and Architecture.	No Modifications.
7	17EC752	IOT and Wireless sensor Networks.	No Modifications.
8	17EC755	Satellite Communication.	No Modifications.

Dr. Mrityunjaya V. Latte  
24.02.2021

Dr. Mrityunjaya V Latte  
Chairman  
BOE-EC/TE/TC/MT Board  
VTU, Belagavi.

DR. MRITYUNJAYA V. LATTE  
M.E., Ph.D.,  
PRINCIPAL  
Academy of Technical Education,  
JSS A T E Campus,  
Uttarahalli-Kengeri Road  
Bengaluru-560 060

"APPROVED"  
Rajendra B. E.  
Registrar (Evaluation)  
Visvesvaraya Technological University  
BELAGAVI - 590018



201217EC75528607



Visvesvaraya Technological University  
Belagavi, Karnataka - 590 018.

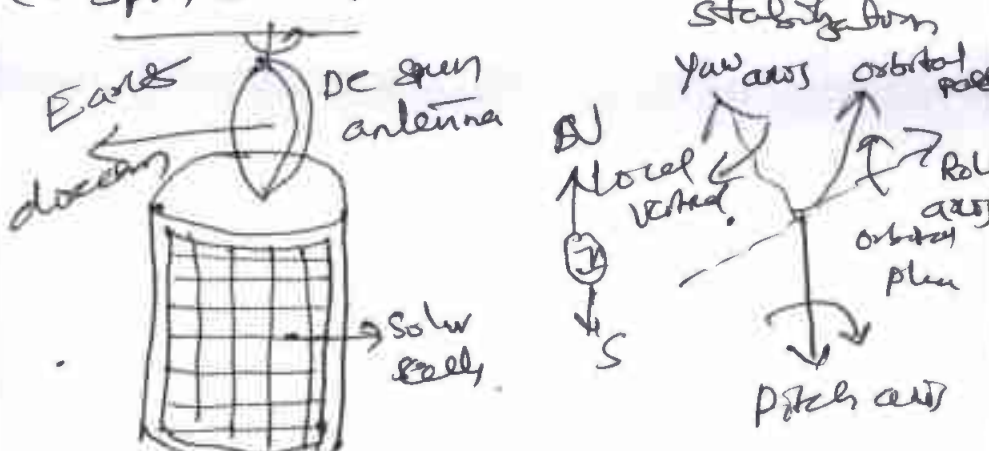
17EC755

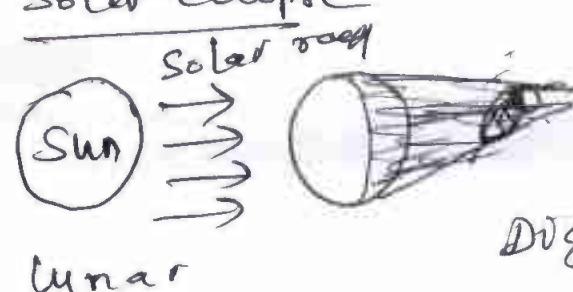
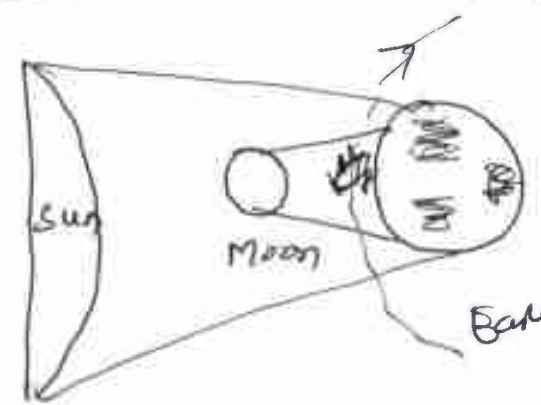
Scheme & Solutions

Signature of Examiner

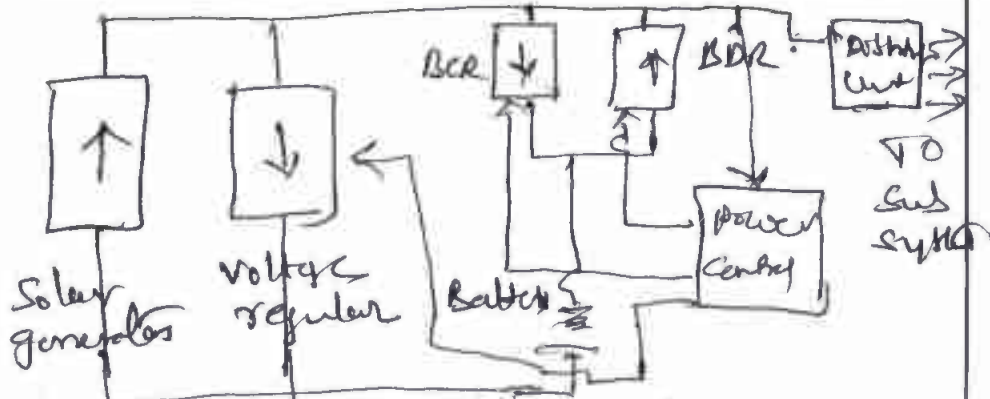
Subject Title: Satellite Communications

Subject Code: 17EC755

Question Number	Solution	Marks Allocated
1(a)	Kepler's 1 <sup>st</sup> law $\rightarrow$ 03M Kepler's 2 <sup>nd</sup> law $\rightarrow$ 03M Kepler's 3 <sup>rd</sup> law $\rightarrow$ 04M explain with suitable sketches & equations.	10M,
(b)	Explain any two with suitable sketches, <u>05x02</u>  ① Apogee, ② perigee, ③ Line of Apogee, ④ Ascending node, ⑤ Descending node, ⑥ Line of nodes and ⑦ Inclination.	10M
2 (a)	<del>Stabilization</del> Satellite Stabilization. (1) Spin Stabilization (2) 3 axis @ body stabilization  <p>The diagram shows a satellite with a cylindrical body and a grid pattern labeled 'Solar Panel'. A 'DC gun antenna' is mounted on top. To the left, 'Earth' and 'down' are indicated. To the right, a 3-axis stabilization diagram shows 'yaw axis' (vertical), 'pitch axis' (horizontal), and 'roll axis' (diagonal). 'orbital plane' is also labeled.</p>	
diagram $\rightarrow$ 2 + 2 } = 10M Explain $\rightarrow$ 3 + 3 }		

Question Number	Solution	Marks Allocated
<p>(b)</p> <p>3(a)</p>	<p><u>Eclipses</u>: is said to occur when the Sun light fails to reach the satellite Solar panel due to an obstruction from celestial body. <math>\rightarrow 01M</math></p> <p><u>Solar eclipse</u></p>  <p>Diagram + explanation <math>\rightarrow 03M</math></p> <p><u>Lunar eclipse</u></p>  <p>Diagram + explanation <math>\rightarrow 3+3=06.</math></p> <p>Diagram + explanation <math>\rightarrow 03M</math></p> <p>Diagram + explanation <math>\rightarrow 03M</math></p> <p>Total: <math>01 + 03 + 06 = 10M</math></p> <p>→ Solar energy          → Solar energy          → Chemical energy          → Nuclear energy</p>	

Question Number	Solution	Marks Allocated
-----------------	----------	-----------------



by. Block diagram of solar power  
The major components of solar systems are

- solar panel
- rechargeable battery
- Regulator & inverter to generate various DC & AC voltage regulated by various subsystem.

Diagram → 4M } (10M)  
 Explain → 6M }

(b)

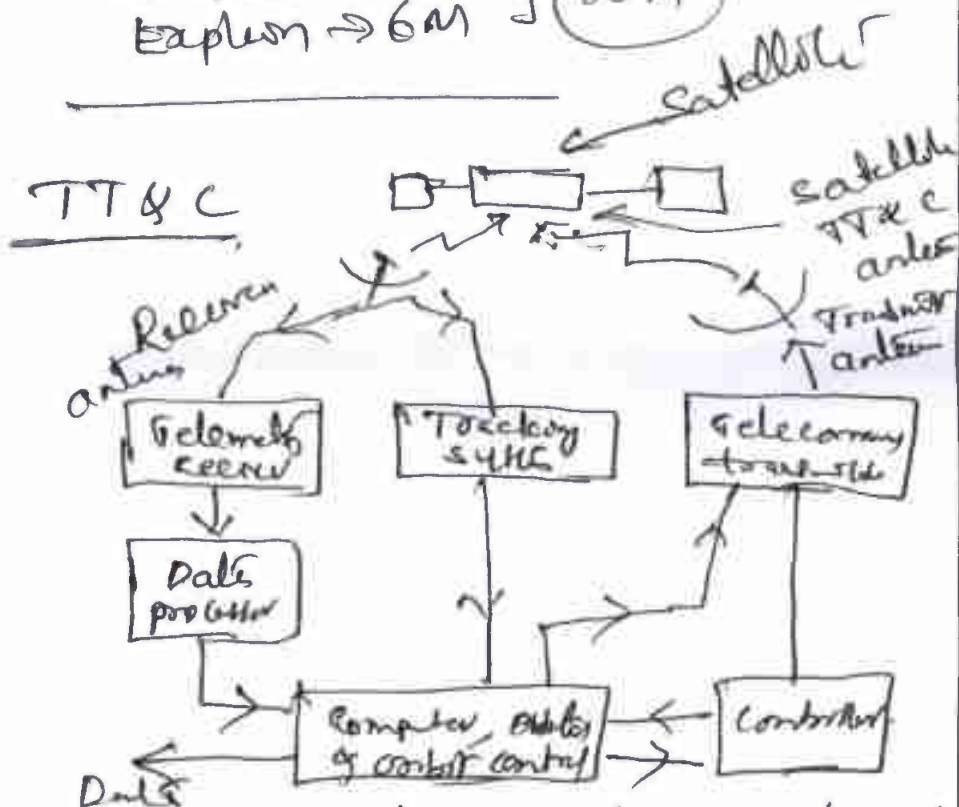


Diagram → 0.4M + Explain → 0.6M = 1.0M

Question Number	Solution	Marks Allocated
4(a)	<p>Based on services provided                      (1) FSS (2) BSS (3) MSS</p> <p>Explanation &amp; Usages <math>3+2+4 = 10M</math></p> <p>(b) <u>Earth station testing</u></p> <p>→ Unit-Component level testing → 2M                      → Subsystem level testing → 2M                      → System level testing → 3+3 } 10M                      (a) Mandatory tests <math>data + exp</math>                      (b) additional tests</p> <p>Mandatory test includes the following</p> <ul style="list-style-type: none"> <li>(a) * Transmit loss parameters</li> <li>(b) * Receiver figure of merit</li> <li>(c) * EIRP stability</li> <li>(d) * speed shape.</li> </ul> <p>→ Out of 4 any one method only.</p>	
5(a)	<p><u>Satellite line parameters</u></p> <ul style="list-style-type: none"> <li>(a) choice of operating freq → 2M</li> <li>(b) propagation considerations → 2M</li> <li>(c) noise considerations → 2M</li> <li>(d) Interference-related problems. -2M</li> </ul> <p>* No explanation only points</p>	08M

Question Number	Solution	Marks Allocated
(b)	Explain of TDMA → 6M ——— CDMA → 6M <hr/>	12M
6 (a)	<u>TDMA Frame Structure</u> Diagram → 4M Explanations → 6M (b) Full derivatives → 6M (c) Assembly explains → 04M <hr/>	10M 6M 4M
7 (a)	<u>VSAT</u> Diagram → 04M Explain → 06M (b) → Television broadcast → 2.5M → International Telephony → 2.5M → data communications service → 2.5M → Broadcast service → 2.5M Brief explanations about each. <hr/>	10M 10M
8 (a)	Transponder Details → 1M TYPE $\left\{ \begin{array}{l} \text{Transparent @ bent type} \rightarrow 3+4 \\ \text{regenerative type} \rightarrow 2M \end{array} \right.$ <sup>D E</sup> (b) Advantages → 4M + disadvantages → 2M (only with) (c) Mention band with frequency → 4M	10M 6M 4M



