



**University School of Automation and Robotics**  
**GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY**  
 East Delhi Campus, Surajmal Vihar  
 Delhi - 110092

<b>Paper Code: ARI 207</b>	L	T/P	Credits
<b>Subject: Analog Electronics</b>	4	-	4

**Marking Scheme:**

Teachers Continuous Evaluation: As per university examination norms from time to time.

End Term Theory Examination: As per university examination norms from time to time.

**INSTRUCTIONS TO PAPER SETTERS: Maximum Marks: As per University Norms**

- There should be 9 questions in the end term examination question paper.
- Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 15 marks.
- Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, students may be asked to attempt only 1 question from each unit. Each question should be 15 marks.
- The questions are to be framed keeping in view the learning outcomes of course/paper. The standard/ level of the questions to be asked should be at the level of the prescribed textbooks.
- The requirement of (scientific) calculators/ log-tables/ data-tables may be specified if required.

**Course Outcomes [Bloom's Knowledge Level (KL)]:**

<b>CO1</b>	Analyze Voltage & Current characteristics of transistor as an amplifier. [K1, K2]
<b>CO2</b>	Describe device structures and physical operations of MOSFET and the effect of capacitances on frequency response. [K1, K2]
<b>CO3</b>	Classify the power amplifiers. [K3, K4]
<b>CO4</b>	Remember the fundamental concepts of operational amplifiers. [K2, K3]

CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	3	-	-	2	-	-	-	-	-	1	-	2
CO2	3	3	3	2	-	-	-	-	-	-	-	2
CO3	-	-	-	2	-	-	-	-	-	-	-	-
CO4	3	-	-	2	-	-	-	-	-	-	1	-

<b>Course Content</b>	<b>No of lectures</b>
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<b>Unit I</b> <b>BJT:</b> Review of semi-conductor Physics, Open-circuited p-n junction, Diode equation, PN diode as a rectifier (forward bias and reverse bias), Voltage characteristics, BJT as an amplifier and as a switch, brief idea of dc analysis, Biasing circuits, small signal operation and models, single stage BJT amplifiers.	[10]
<b>Unit II</b> <b>MOSFET Circuits:</b> MOSFET structure and I-V characteristics. Depletion type and Enhancement type MOSFET, MOSFET as a switch. small signal equivalent circuits – gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.	[10]
<b>Unit III</b> <b>Differential Amplifiers:</b> MOS differential Pair, Small signal operation, frequency response of differential amplifier, Introduction to differential amplifier with active load. <b>Multi-Stage and Power Amplifiers:</b> Direct coupled and RC Coupled multistage amplifiers, Feedback amplifiers, Multivibrators – Analysis and Design of Bistable, Monostable. Power Amplifiers: Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, and cross over distortion.	[10]
<b>Unit IV</b> <b>Operational Amplifiers:</b> Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Op-amp voltage adder, Square-wave and triangular-wave generators.	[10]
<b>Text Books:</b> [T1] Adel S. Sedra, Kenneth C. Smith, “ <i>Microelectronic Circuits</i> ”, Oxford University Press, Fifth Edition, 2005. [T2] Thomas L. Floyd, David M. Buchla, <i>Electronics Fundamentals: Circuits, Devices &amp; Applications</i> , 8th Edition, Pearson education, 2014.	
<b>References:</b> [R1] Donald E. Neaman, “ <i>Electronic Circuit, Analysis and Design</i> ”, Tata McGraw Hill Publishing Company Limited, Second Edition, 2006. [R2] David A. Bell, “ <i>Electronic devices and Circuits</i> ”, 5th Edition, Oxford University Press India, 2008.	