MAHATMA GANDHI UNIVERSITY, KERALA

Abstract

Bachelor of Science (Honours) Electronics with Computer Technology – Fifth Semester – Modifications to the Course Outcomes, Course Content, pattern for End Semester Evaluation, Removal and Inclusion of courses, Substitution of course and approval of the syllabi for new courses - Approved - Orders Issued.

ACA 16

No. 5394/ACA 16/2026/MGU Priyadarsini Hills,Dated: 29.05.2026

Read:-1. U.O.No.5797/AC A16/2024/MGU, dated.27.06.2024.

2. Minutes of the meeting of the Expert Committee on Electronics (UG).

3. Orders of the Professor in charge of the Vice Chancellor under Section 10(17), Chapter III of the Mahatma Gandhi University Act 1985, dated. 26.05.2026.

ORDER

The syllabi of various Honours Under Graduate Programmes coming under The MGU-UGP (Honours) Regulations, 2024, have been approved vide paper read as (1) above and published on the website of the University.

The Expert Committee on Electronics (UG), discussed the need to modify the Course Outcomes, Course Content of DSC/DSE/SEC type courses, to modify the pattern for End Semester Evaluation(ESE) of DSE type courses, to include a new DSC course MG5DSCECT302: Embedded Systems with AVR Microcontroller, (Syllabus link - https://cap.mgu.ac.in/mguugp/syllabus.jsp) to remove the course MG5DSEECT305: Computer Assembling and Maintenance, from the syllabus, to substitute the course MG5SECECT300: Office Automation and Content Creation, with MG5SECECT300: Responsive Web Design and Frontend Development, (Syllabus link - https://cap.mgu.ac.in/mguugp/syllabus.jsp), in the Fifth Semester syllabus of Bachelor of Science (Honours) Electronics with Computer Technology programme, and has submitted recommendations vide paper read as (2) above.

(Recommendations are attached as Annexure)

Considering the urgency, sanction has been accorded by the Professor in charge of the Vice

Chancellor, in exercise of the powers of the Academic Council vested upon him under Section 10(17), Chapter III of the Mahatma Gandhi University Act 1985, vide paper read as (3) above, to approve the said recommendations.

Hence, the Course Outcomes, Course Content and pattern for End Semester Evaluation of the said courses in the Fifth Semester syllabus of **Bachelor of Science (Honours) Electronics with Computer Technology** programme, stands modified to this extent.

Orders are issued accordingly.

SUDHA MENON J

ASSISTANT REGISTRAR III
(ACADEMIC)
For REGISTRAR

Copy To

1. PS to VC
2. PA to Registrar/CE
3. Convenor, Expert Committee, Electronics (UG)
4. JR 2 (Admin)/DR 2, AR 3 (Academic)
5. JR/DR/AR (Exam)
6. Tabulation/Academic Sections concerned
7. AC C1/AC C2 Sections
8. IT Cell 3/OQPM1 Sections
9. PRO/IQAC/Records Sections
10. Stock File/File Copy

File No. 38356/AC A16-3/2026/ACA 16

Forwarded / By Order

Section Officer

Annexure

Semester III, IV, V & VI

Index Page

Specialization Title (Modified)		Page No. 8,9,10,11
Existing	**Modified**	
Embedded System	Embedded Systems	

Semester V

Index Page (Modified)

Course Code	Title of the Course (Modified)	Type of Course DSC, MDC, SEC etc.	Credit	Hours / week	Hour Distribution/ week				Page No.
					L	T	P	O	
MG5DSCECT300	No Change								10
MG5DSCECT301	Artificial Intelligence and Machine Learning	DSC (Any One)	4	5	3		2		
MG5DSCECT302	Embedded Systems with AVR Microcontroller * **(Included)**								
MG5DSEECT300	No Change								
MG5DSEECT301									
MG5DSEECT302									
MG5DSEECT303									
MG5DSEECT304									
MG5DSEECT305	Computer Assembling and Maintenance- **Course Removed**								
MG5DSEECT306	No Change								
MG5DSEECT307									
MG5DSEECT308									
MG5DSEECT309									
MG5DSEECT310									
MG5SECECT300	Responsive Web Design and Frontend Development **(Course Substituted)**	No Change							
MG5SECECT301	No Change								
MG5SECECT302									

*Not to be opted by Embedded Systems specialization stream

Course Name: Digital Design Using Verilog
Course Code: MG5DSCECT300

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE)

2. Practical (Marks Included)	
Total Marks: 35 **Duration: 2 Hrs.**	**Page No** 131,132
a. Viva - 10 Marks b. Lab report - 5 Marks c. Demonstration - 20 Marks	

Course Name: Artificial Intelligence and Machine Learning
Course Code: MG5DSCECT301

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains (Modified)	PO No. (Modified)	Page No.
1	No Change	No Change	No Change	133
2			1,2,4,10	
3		A	1,2,4,9,10	
4		A	No Change	

COURSE CONTENT
Content for Classroom Transaction (Units)

Module (Modified)	Units (Modified)	Course Description (Modified)	Hrs	CO No.	Page No.
1	1.1	Introduction to Artificial Intelligence: Introduction, Definition and Scope. Concept of Rationality	No Change	No Change	133,134
	1.2	Problem Solving in AI: Problem-Solving, Find Goal and formulate the Goal. Design the problem and Problem			

		Formulation, Steps involved in Problem-Solving, Crucial component of the Problem, Real-Time Problem-Solving Examples			
	1.3	Search Techniques: Searching Methods: Greedy Best-First Search, A* Search Algorithm			
	1.4	Local Search: Introduction to Local Search, Hill Climbing Algorithm, Simulated Annealing, Local Beam Search, Genetic Algorithms			
2	2.1	Adversarial Search and Games: Game Theory Basics, Mini-Max Algorithm, Alpha-Beta Pruning	No Change	No Change	
	2.2	Logic and logical agents: Knowledge-Based Agents, Logic and Logical Reasoning, Logical Inference Inference Algorithms and Properties, Propositional Logic: Syntax and Semantics			
	2.3	Uncertainty: Concept of Uncertainty, Basics of Probability, Full Joint Inference, Independence, Bayes Theorem and Naïve Bayes, Bayesian Networks (Syntax & Factorization), Inference in Bayesian Networks, Conditional Independence, Markov Blanket, D-Separation, Bayesian Networks (Rejection Sampling, Likelihood Weighting)			
	2.4	Fundamentals of Machine Learning: Definition and Concepts. Types of Machine Learning, Visualization Examples for ML Types, Training, Validation, and Testing Data Sets.			
3	3.1	Data Handling: Definition of Data, Types of Attributes,			

		Discrete and Continuous Attributes, Characteristics of Data, Outliers and Data Quality Problems, Data Pre-processing. Confusion Matrix - Performance Evaluation. Receiver Operating Characteristic (ROC) Curve. Handling Imbalanced Classes. Challenges of Machine Learning	No Change	No Change	
	3.2	Linear Regression Models: Linear Regression, Model Learning Process (Model Engine), Cost Function, Linear vs Nonlinear Functions, Optimization Techniques, L1 and L2 Regularization, Early Stopping			
	3.3	Classification & Supervised Learning Algorithms: Classification: Concepts and Types, Logistic Regression, Binary vs Multi-class Classification Cross Entropy and Cost Optimization. Decision Tree: Construction and Examples, Pruning, Gini Impurity and Entropy, Information Gain, Issues in Decision Trees. Instance-Based Learning: K-Nearest Neighbour (KNN), K Value Selection (Elbow Method), Locally Weighted Regression			
	3.4	Advanced Learning Techniques: Support Vector Machine (SVM): Basics, Maximum Margin Classifier, Linear and Nonlinear Classification. Bayesian Learning: Bayes Theorem, Naïve Bayes Classifier, Maximum Likelihood Estimation Ensemble Learning: Bagging and Boosting, Random Forest Algorithms,			

		AdaBoost Algorithms, Gradient Boosting Algorithms.			
4 **(Module Number Included)**	4.1 **(Unit Number Included)**	**Practicals:** 1. Understanding AI & Rational Agents 2. Problem Formulation & Goal-Based Agent 3. Greedy Best-First Search 4. Hill Climbing Algorithm 5. Mini-Max Algorithm (Game AI) 6. Bayes Theorem Implementation 7. Linear Regression (Basic ML Model) 8. K-Nearest Neighbours (KNN) Classification **Tools:** Python (Version 3.8 or above) Machine Learning Libraries (Exp. 6–8): • NumPy for numerical operations • Pandas for handling datasets • scikit-learn for ML models (Linear Regression, KNN) • Matplotlib for visualization (optional but recommended) **Optional Tools :** Google Colab Dataset Sources (For ML Experiments) • Built-in datasets from scikit-learn CSV files (student marks, simple classification data)	No Change	No Change	
5	Teacher Specific Content				

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE)

2. Practical (Marks Included)	
Total Marks: 35 **Duration: 2 Hrs.**	**Page No** 135
a. Viva -10 Marks b. Lab report - 5 Marks c. Demonstration – 20 Marks	

References (Modified)

1. Manikandan Panneerselvam , An introduction to Artificial intelligence and machine learning by , Schand publications 2023 2. Gupta, Rohan, et al. "Artificial intelligence to deep learning: machine intelligence approach for drug discovery." Molecular diversity 25.3 (2021): 1315-1360. 3. Watt, Jeremy, Reza Borhani, and Aggelos K. Katsaggelos. Machine learning refined: Foundations, algorithms, and applications. Cambridge University Press, 2020 4. Akerkar, Rajendra. Introduction to artificial intelligence. PHI Learning Pvt. Ltd., 2014.	**Page No.** 135

Course Name: Cloud Computing
Course Code: MG5DSEECT300

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No.	Page No.
1	Explain the fundamental concepts of cloud computing, including service models, deployment models, and essential characteristics of cloud environments	No Change	No Change	136
2	No Change			
3				
4	Describe cloud networking, storage solutions, hybrid cloud strategies, and emerging career opportunities and certifications in cloud computing	U		

COURSE CONTENT
Content for Classroom Transaction (Units)

Module	Units	Course Description (Modified)	Hrs	CO No.	Page No.
1	1.1	Cloud computing historical overview, Cloud computing: Virtualization, Evolution of distributed systems to cloud computing, Understand the fundamental elements of cloud computing	No Change	No Change	136,137, 138

	1.2	No Change	No Change	No Change	
	1.3				
	1.4				
2	2.1				
	2.2	Amazon Web Services- Application and data compatibility, major AWS services, compute management, monitoring and logging, security management, governance and compliance, cloud migration strategies			
	2.3	No Change			
	2.4	Microsoft Azure- Application and data compatibility, major Azure services, management and monitoring in Azure, governance, compliance, and security services.			
3	3.1	No Change			
	3.2	Infrastructure-level cloud security, Application-level cloud security, Data-level cloud security			
	3.3	No Change			
	3.4				
4	4.1				
	4.2				
	4.3	Cloud Storage Basics-Cloud storage types, Block storage, Object storage, File storage, Storage plan selection criteria, Cloud databases, Cloud file storage, Backup and recovery Services, Sample applications			
	4.4	No Change			
5	Teacher Specific Content				

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

Theory			
Max.Marks: 70			**Duration: 2 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
MCQ	16 out of 16	16 x 1 = 16	138
Short Answer	6 out of 8	6 x 5 = 30	
Essay	2 out of 4	2 x 12 = 24	

Course Name: Computer Forensic
Course Code: MG5DSEECT301

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains (Modified)	PO No.	Page No.
1	No Change	No Change	No Change	139
2				
3		A		
4		No Change		

COURSE CONTENT
Content for Classroom Transaction (Units)

Module	Units	Course Description (Modified)	Hrs	CO No.	Page No.
1	1.1	Introduction to Computer Forensics, Investigative Process - Identification, preservation, collection, examination, Analysis, presentation	No Change	No Change	139,140
	1.2	Digital Forensics Categories- Computer Forensics, Mobile Forensics, Network Forensics, Database Forensics			
	1.3	Computer Crimes: Definition of			

		Computer Crimes, Traditional computer crimes-Phreaking, Hacking, Theft of Intellectual Property, Malware, Theft of Information, Data Manipulation	No Change	No Change	
	1.4	**Digital Evidence**-Types of digital evidence, Sources of digital evidence, Challenge of Acquiring Digital Evidence			
2	2.1	**Computer forensic domains**: Operating system, email Forensics, Live memory forensics, web forensics, network forensics, multimedia forensics			
	2.2	Data Acquisition and Authentication Process, Types of data acquisition-Static acquisition, Live acquisition			
	2.3	**Disk Structure and digital evidence**: OS with supported file system. **File systems**-Windows Systems-FAT32 and NTFS, UNIX file Systems			
	2.4	**Validating Data Acquisitions**-Validation techniques CRC-32, MD5, and SHA-1 to SHA-512			
3	3.1	Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Data carving techniques			
	3.2	Retrieving deleted data: desktops, laptops and mobiles, retrieving data from slack space, renamed file, ghosting, compressed files			
	3.3	Free and open-source Computer forensics tools: Autopsy, Sleuth Kit, Commercial Forensics Tools-EnCase, FTK			
	3.4	No Change			
4	4.1				
	4.2				
	4.3				
5	Teacher Specific Content				

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

Theory			
Max.Marks: 70			**Duration: 2 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
MCQ	16 out of 16	16 x 1 = 16	141
Short Answer	6 out of 8	6 x 5 = 30	
Essay	2 out of 4	2 x 12 = 24	

Suggested Readings (Modified)

1. Bill Nelson, Amelia Phillips, Christopher Steuart, Guide to Computer Forensics and Investigations Cengage Learning India Pvt. Ltd.2000 2. William Oettinger, Learn Computer Forensics, Packt Publishing Limited, 2022 3. Arora, Bhavna. "Exploring and analyzing Internet crimes and their behaviours." Perspectives in Science 8 (2016): 540-542 4. Lin, Xiaodong, Xiaodong Lin, and Lagerstrom-Fife. Introductory Computer Forensics. Springer International Publishing, 2018	**Page No.** 141

Course Name: Instrumentation
Course Code: MG5DSEECT302

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

Theory			
Max.Marks: 70			**Duration: 2 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
MCQ	16 out of 16	16 x 1 = 16	143
Short Answer	6 out of 8	6 x 5 = 30	
Essay	2 out of 4	2 x 12 = 24	

Course Name: Microwave Electronics
Course Code: MG5DSEECT303

Semester	**5** **(Typographical Error Corrected)**	**Page No :** 145

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

Theory			
Max.Marks: 70			**Duration: 2 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
MCQ	16 out of 16	16 x 1 = 16	146
Short Answer	6 out of 8	6 x 5 = 30	
Essay	2 out of 4	2 x 12 = 24	

Course Name: Smart Industry
Course Code: MG5DSEECT304

COURSE CONTENT
Content for Classroom Transaction (Units)

<table>
<tr><th>Module</th><th colspan="2">Units
(Modified)</th><th>Course Description</th><th>Hrs</th><th>CO No.</th><th>Page No.</th></tr>
<tr><td rowspan="5">1</td><td colspan="2">1.1</td><td rowspan="5">No Change</td><td rowspan="5">No Change</td><td rowspan="5">No Change</td><td rowspan="8">148</td></tr>
<tr><td colspan="2">1.2</td></tr>
<tr><td colspan="2">1.3</td></tr>
<tr><td>Existing</td><td>Proposed</td></tr>
<tr><td>1-4</td><td>1.4</td></tr>
<tr><td>2</td><td colspan="5" rowspan="3">No Change</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td></tr>
<tr><td>5</td><td colspan="5">Teacher Specific Content</td></tr>
</table>

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

Theory			
Max.Marks: 70			**Duration: 2 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
MCQ	16 out of 16	16 x 1 = 16	149
Short Answer	6 out of 8	6 x 5 = 30	

Essay	2 out of 4	2 x 12 = 24	

Course Name: Computer Assembling and Maintenance
Course Code: MG5DSEECT305

Course Removed	**Page No :** 150-152

Course Name: Industrial Automation
Course Code: MG5DSEECT306

COURSE CONTENT
Content for Classroom Transaction (Units)

<table>
<tr><th>Module</th><th colspan="2">Units
(Modified)</th><th>Course Description</th><th>Hrs</th><th>CO No.</th><th>Page No.</th></tr>
<tr><td rowspan="5">1</td><td colspan="2">1.1</td><td rowspan="5">No Change</td><td rowspan="5">No Change</td><td rowspan="5">No Change</td><td rowspan="9">154</td></tr>
<tr><td colspan="2">1.2</td></tr>
<tr><td colspan="2">1.3</td></tr>
<tr><td>Existing</td><td>Proposed</td></tr>
<tr><td>1-4</td><td>1.4</td></tr>
<tr><td>2</td><td colspan="5" rowspan="3">No Change</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td></tr>
<tr><td>5</td><td colspan="5">Teacher Specific Content</td></tr>
</table>

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

Theory			
Max.Marks: 70			**Duration: 2 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
MCQ	16 out of 16	16 x 1 = 16	155
Short Answer	6 out of 8	6 x 5 = 30	
Essay	2 out of 4	2 x 12 = 24	

Course Name: Cyber Security
Course Code: MG5DSEECT307

Course Details	Learning Approach	Lecture (Modified)	Tutorial (Modified)	Practical	Others	Page No.
		No Change				156

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

Theory			
Max.Marks: 70			**Duration: 2 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
MCQ	16 out of 16	16 x 1 = 16	157
Short Answer	6 out of 8	6 x 5 = 30	
Essay	2 out of 4	2 x 12 = 24	

Course Name: Advanced Python
Course Code: MG5DSEECT308

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

Theory			
Max.Marks: 70			**Duration: 2 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
MCQ	16 out of 16	16 x 1 = 16	160
Short Answer	6 out of 8	6 x 5 = 30	
Essay	2 out of 4	2 x 12 = 24	

Course Name: Analog and Digital Communication
Course Code: MG5DSEECT309

COURSE CONTENT
Content for Classroom Transaction (Units)

Module	Units (Modified)	Course Description (Modified)	Hrs	CO No.	Page No.
1	No Change				162
2					
3					
4	4.1 **(Unit Number Included)**	Simulations using LTSpice 1. Colpitts oscillator 2. Hartley oscillator 3. Filters – HPF, LPF, BFP 4. AM generation 5. FM generation 6. Balanced mixer 7. ASK generation 8. FSK generation 9. PSK generation	No Change	No Change	
5	Teacher Specific Content				

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

Theory			
Max.Marks: 70			**Duration: 2 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
MCQ	16 out of 16	16 x 1 = 16	162
Short Answer	6 out of 8	6 x 5 = 30	
Essay	2 out of 4	2 x 12 = 24	

Course Name: Robotics and Industrial Automation
Course Code: MG5DSEECT310

MODE OF ASSESSMENT

B. End Semester Evaluation (ESE) (Modified)

1.Theory			
Max.Marks: 50			**Duration: 1.5 Hrs.**
Type of Questions	**Number of Questions to be answered**	**Marks**	**Page No**
Part A: Short Answer	10 out of 14	10 x 2 = 20	166
Part B: Short Essay	6 out of 8	6 x 5 = 30	

2.Practical (Marks Included)	
Total Marks: 35 **Duration: 2 Hrs.**	**Page No** 166
a. Viva - 10 Marks b. Lab report - 5 Marks c. Demonstration - 20 Marks	

Course Name: Mobile App Development
Course Code: MG5SECECT301

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome (Modified)	Learning Domains	PO No. (Modified)	Page No.
1	Explain the features and syntax of Dart programming language	No Change	No Change	171
2	Classify different types of mobile applications and development approaches		1,2	
3	Apply Flutter widgets, layouts, and state management techniques in app development		No Change	
4	Design and develop functional mobile applications using Flutter and Dart			

COURSE CONTENT
Content for Classroom Transaction (Units)

Module	Units	Course Description (Modified)	Hrs	CO No. (Modified)	Page No.
1	1.1	No Change	No Change	No Change	171,172
	1.2	**Operators** - Arithmetic, relational, logical operators, Assignment operators, ternary operator; Control flow- if, else, switch, loops, break, continue			
	1.3	Function declaration, return types, Positional parameters, Optional / named parameters, Arrow functions			
	1.4	No Change			
2	2.1	IDE setup using Visual Studio Code / Android Studio Widgets – Stateless Widgets, Stateful Widgets, Layout Widgets, Material Widgets Functions, Collections - Map, Set. Working with assets - Fonts, Images			
	2.2	No Change			
	2.3				
	2.4				
3	3.1	Storage - SQLite, Shared preferences, Hive, Firebase - Authentication, Storage, Firestore, Push notifications, Remote config			
	3.2	Advanced Dart Functional concepts in Dart – Anonymous functions, Higher-order functions, map(), where(), reduce()			
	3.3	No Change			
	3.4				
	3.5	**Hands on Session** 1. Install Flutter SDK, IDE, and emulator setup		4	

		2. Develop a basic mobile UI application using widgets and layouts 3. Create a form-based mobile application with input validation and on-device local data storage using SQLite/Hive. 4. Build, debug, and generate APK release file	No Change		
4	Teacher Specific Content				

Suggested Readings (Modified)

1. Chopra, Deepti, and Roopal Khurana. Flutter and Dart: Up and Running: Build native apps for both iOS and Android using a single codebase (English Edition). BPB Publications, 2023. 2. Alessandro Biessek , Flutter for Beginners, Packt Publishing 2019	**Page No.** 173

Course Name: Low Voltage System for Building Management
Course Code: MG5SECECT302

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome (Modified)	Learning Domains (Modified)	PO No.	Page No.
1	No Change	No Change	No Change	174
2				
3	Analyse the design and working principles of building security systems	An		
4	Apply concepts of fire protection, energy monitoring, and renewable energy integration to improve safety and energy efficiency	A		

COURSE CONTENT
Content for Classroom Transaction (Units)

<table>
<tr><th>Module</th><th>Units</th><th>Course Description</th><th>Hrs</th><th>CO No. (Modified)</th><th>Page No.</th></tr>
<tr><td>1</td><td colspan="4" rowspan="2">No Change</td><td rowspan="7">175</td></tr>
<tr><td>2</td></tr>
<tr><td rowspan="4">3</td><td>3.1</td><td rowspan="4">No Change</td><td rowspan="4">No Change</td><td>No Change</td></tr>
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<tr><td>3.3</td><td>No Change</td></tr>
<tr><td>3.4</td><td>4</td></tr>
<tr><td>4</td><td colspan="4">Teacher Specific Content</td></tr>
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